The American horologist and jeweler

INCORPORATING HOROLOGY

Vol. 20 January, 1953 No. 1

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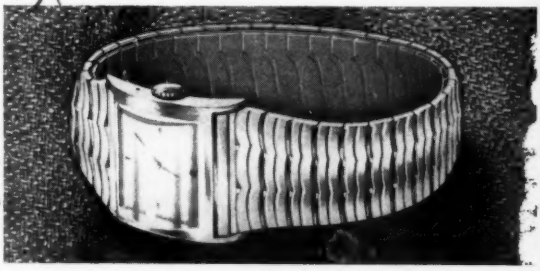
JAN 15 1953

DETROIT

About the Gemex Brigand, 567, you'll say: "That's a good number, it's going to move." You recognize exclusive design in the tapered line that makes band and watch look like one; and quality deserving of your personal recommendation, because it's **Gemex.** The Brigand retails for $12.95.



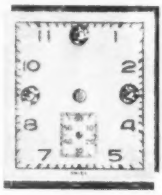
GEMEX
FINE WATCH BANDS

35th ANNIVERSARY

R V.20 1953

More PROFIT Idea of the Month

Write For Catalog



Suggest a 3 Diamond Dial — Now available for all popular Watches

YOUR COST AS LOW AS $6.75

MORE PROFIT — REFINISH THE DIAL WITH THAT REPAIR JOB

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Suggest a dial refinish with that repair job. Any dial can be refinished in the 3 diamond style, or a new dial can be furnished. INTERNATIONAL carries one of the largest stocks of shapes and designs. Ask your jobber to show you an INTERNATIONAL 3 Diamond dial, the sparkle and beauty of this dial will sell on sight.

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As watch dial specialists, we carry a very large stock of manufactured dials in all styles and shapes, ready for immediate shipment.

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THE JEWELERS Member BOARD OF TRADE

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Refinished or manufactured, super-fast service on any quantity 1 or a 1000. Contact your jobber or write

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7J ..... $ 3.75
AS 1012 (5½)
17J ..... $ 7.00
AS 976 (5L)
17J ..... $ 6.50
AS 970 (8¾)
17J ..... $ 5.00
7J ..... $ 3.75
AS 984-1002 (10½)
17J ..... $ 5.00
7J ..... $ 3.50
AS 1194 (10½-11½)
17J Sweep ..... $ 5.00
7J ..... $ 4.00
10½L Movements ..... $3.00 up
3¾ baguette (FFI-59)
17J ..... $ 7.00
5-5½-6 ligne oval
15-17J ..... $ 5.00
6½L oval
15-17J ..... $ 4.00
6¾ tonneau
15-17J ..... $ 4.00
6¾ round (AS 969 etc.) 17J $10.00
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15-17J $10.00
5AP (5½ oval)
15J, $7.50; 17J ..... $ 8.00
6AP (6½ oval)
15J, $6.50; 17J ..... $ 8.00
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15J, $6.50; 17J ..... $ 8.00
7AM (7¾ round)
17J ..... $ 8.00
8AH 17J $10.00
13AF 15-17J $10.00
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17J $12.00
7AP
17J $10.00
21J $14.00
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15J ..... $ 7.50
17J $10.00
10BS-BC
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15J ..... $ 7.00
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7J ..... $ 6.00
15J ..... $ 8.00
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16 Size Elgin: 7J, $5.00; 15J, $6.50; 17J S.R., $7.00; D. R., $10.00.
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5½ ligne AS 1012 (Replaces Bulova 5AB-Wittnauer 5W-Benrus AE) $13.00
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We can supply these movements listed in various jewels.
We carry many more models and makes on hand.

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The American horologist and jeweler

Incorporating Horology

Official National Publication of the United Horological Association of America, Inc., and all its affiliates.

VOLUME 20 | JANUARY, 1953 | NO. 1

Owned and Published Monthly by
ROBERTS PUBLISHING COMPANY
P. O. Box 7127—Capitol Hill Station
Denver 6, Colorado

PERSONNEL

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35 cents per copy—$3.00 per year in the United States, Pan-American countries, i. e., Mexico, Republic of Panama, Colombia, Brazil, Chile, and Ecuador.
Canada—$3.50 per year.
All other countries—$5.00 per year.

New subscribers should state occupational classification on subscription order.

Give both old and new addresses when notifying change of address.

Address all correspondence to the American Horologist & Jeweler, P. O. Box 7127, Capitol Hill Station, Denver 6, Colorado.

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(Entered as second-class matter July 19, 1941, at the Postoffice in Denver, Colorado, under the Act of March 3, 1879.)

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YOU WROTE THIS 7-POINT PROGRA FOR

Your Watch Inspection Time Contest entri prov
traffic-building advice fr coas

All the prizes have been awarded in the 4th Annual Watch Inspection Time Contest. Winners were announced in the December trade press.

And now it's *your* turn! For this was a contest with a purpose. Yes, to provide you with the business-building techniques that are creating Service Department customers for Quality Jewelers all over the country.

So here, compiled from the outstanding entries you sent in, is a 7-point watch maintenance program. It adds up to good watch-care advice for your customers . . . and good business for you.

Best of all, it works! These suggestions have paid off in stores just like yours from Maine to California. They build jeweler prestige. They bring customers back into your store — *regularly*. And they build the kind of traffic that leads to even more sales in years ahead.

TRAFFIC-BUILDING WATCH-CA DVICE

1. FROM NEW YORK!

Always have your watch inspected by your Quality Jeweler once a year. It's a check-up that's sure to add years to its useful life!

2. FROM TEXAS!

For maximum accuracy, your watch needs expert regulation. Let your Quality Jeweler perform this service for you—without charge, of course.

3. FROM WASHINGTON, D. C.!

Never open your watch case. Should your watch stop, take it to your Quality Jeweler at once. Experience shows that untrained hands can do your watch more harm in one minute than 10 years of constant wear!

4. FROM CALIFORNIA!

Even if your watch is water-resistant and shock-proof—try not to invite trouble. Avoid wetting your watch—or giving it unnecessary rough handling.

5.

6.

7. F

"For

The WATCHMAKERS OF SWITZERLAND

A FOR CARE OF A QUALITY SWISS WATCH

ri provide
ro coast to coast

CA DVICE FOR YOUR CUSTOMERS

5. FROM ILLINOIS!

Like all of us, your fine Swiss watch functions best when it keeps regular habits. So try to wind it regularly. Most people find morning is best, since we normally arise about the same hour each day.

6. FROM LOUISIANA!

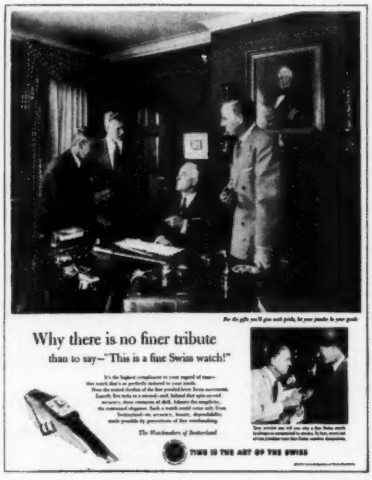
Should your watch, in future years, require parts replacement, be sure it is serviced by a Quality Jeweler who provides *Genuine* packaged Swiss repair parts. For *Genuine* parts, though costing no more, are your only assurance of replacements designed specifically for your watch, by the very same factory that made it.

7. FROM RHODE ISLAND!

Your watch strap is not simply decorative. It is a vital protection. If it should become loose or worn, take it to your Quality Jeweler at once for adjustment or replacement. It's a move that's sure to save you money in the long run!

And to build your sales...

HERE IS THE JANUARY AD WE'VE WRITTEN FOR YOU


Why there is no finer tribute
than to say—"This is a fine Swiss watch!"
The Watchmakers of Switzerland
THIS IS THE ART OF THE SWISS

The holidays may be over, but your overhead isn't. That's why this Watchmakers of Switzerland advertising keeps selling, selling, selling for the Quality Jeweler.

It's just one more message in our year-round campaign to tell your customers about *you* and the quality products you sell.

"For the gifts you'll give with pride—let your jeweler be your guide"

Quick Fit CROWNS

COMPLETE CROWN ASSORTMENT IN STANDARD STEEL STACK-UP CABINET

Complete Crown Guide and logical arrangement of cabinet make selecting the correct crown an easy job with this assortment. Crown Guide shows "how to select the correct crown" with large easy-to-see illustrations and lists all the necessary crown data. As a further aid the correct crowns for popular models of Bulova, Elgin, Gruen, Hamilton, Longine, etc., are shown on a separate chart.

Cabinet contains one each of 72 Yellow crowns for bracelet and pocket watches; 18 each Stainless, Chromium and Yellow waterproof crowns; and 9 Yellow dustproof. A total of 135 crowns in 144 bottle cabinet No. 60-363M — $28.50.

Your customer deserves a crown that will look new for years, not months. Quick-Fit Quality Crowns have an outer shell of approx. .0005" of 14 kt. gold, your assurance of customer satisfaction.

Refills now available in sealed anti-tarnish envelopes — your assurance of Quick-Fit quality.

Order from your Jobber TODAY

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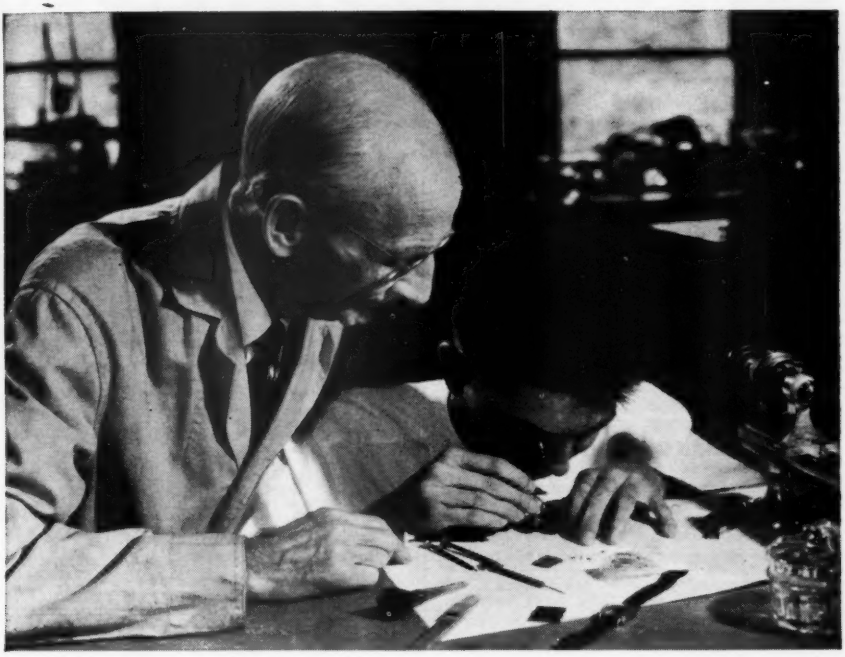

Korean Vets Now Eligible—

Learn Watchmaking at America's Leading School

Elgin now offers its complete watchmaking course to veterans of the Korean War under G.I. Bill of Rights privileges.

At Elgin you learn under practical conditions, supervised by the dean of American Watchmakers, W. H. Samelius. And the complete course includes watch selling and the management of the jewelry store.

In just the time that it takes to *fill in, tear out,* and *mail* the attached coupon—you can assure yourself all the information that will make you a financially independent craftsman for life. Why not do it now?

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Gentlemen:
Kindly send me full information about your course in watchmaking.

Name _____ (Please Print Name and Address)

Address _____

City _____ Zone _____ State _____

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HARD-TO-GET PARTS SUPPLIED

It pays for our men to keep on looking for the item you need because you pay us $1.00 per job for our time. Difficult and so-called impossible jobs are routine with B-M-S because we do them every day. If we can't supply a part, we will repair your old one—or supply another new or used movement. Lost or damaged bridges and other parts may be duplicated.

* COMPLETE STAFF SERVICE

"$1.00 Service Charge On These Items"

Staffs made to order from sample only	$ .50
Staffs with high grade finish	1.50
Cylinders	2.50
Staffs made and set into balance, and balance trued. Send sample staff, wheel and roller only	1.50
Cylinders	3.50
French Clock Platforms	$3.50 up

* BEZELS MATCHED & MADE

"$1.00 Service Charge On These Items"

(Prices include free round unbreakable crystal)

Round Bezels made-to-order for Chrono-, graphs, etc.—	
White	$5.50
Yellow	7.50
Bezels matched to hunting case, average	1.50
Bezels matched to 3-piece filled cases, average	1.75

EVERY BEZEL FITTED AND TIGHTENED BEFORE SHIPMENT. BACKS MATCHED & MADE.

* BRAND NEW ENAMEL DIALS

"$1.00 Service Charge On These Items"

For 16 size Hamilton 4-foot	$5.00
For 16 size Illinois Bunn Special	5.00
For 12 size Illinois	3.50
For 18 size Hamilton O.F.	5.00

Send Sample for Any Other Dial Needed

* ORIGINAL ENAMEL DIALS

$1.00 Service Charge On These Items

We can supply dials in perfect condition from used movements . . . sizes 10/0 to 18. Send old dial or sketch of feet and position of "12"—$1.00 up.

* WHEELS & PINIONS

"$1.00 Service Charge On These Items"

Repivoted	$ 2.50 up
Teeth Repaired, first tooth	1.25
Additional, each	1.00
Barrels, per tooth	1.50
New Pinions made by hand	$5.00, $7.50, 10.00

* MOVEMENT FITTING SERVICE

"$1.00 Service Charge On These Items"

We rebuild old-fashioned diamond cases from the inside to accommodate new 5L 17J movements. We supply the movement, matching dial and crown. We rhodium plate and refinish the case.

Your total cost	$25.00
Thin model cases	30.00

* FOR SALE - MOVEMENTS - USED

"$1.00 Service Charge On These Items"

Our movements are hand-picked, GUARANTEED perfect for replacement. All they need is a cleaning. We will replace any defective part free, or, if you are not satisfied with our movement, we will exchange it or give you a cash refund.

FF 120 (6x8) 17J			$ 5.00
7J			3.75
AS 970 (8¾) 17J			5.00
7J			3.75
AS 976 (5L) 17J			6.75
AS 1194 17J (Specify 10½ or 11½)			5.00
7J			3.25
Gruen, Wrist or Pocket—			
Any 15J Model			9.00
Any 17J Model			10.00
Elgin-Waltham—			
0 or 3/0 Size			
15J EL	$6.50	WAL	4.75
12 & 16 Size			
7J EL	$5.00	WAL	4.00
15J EL	$7.00	WAL	6.00
17J EL	$9.00	WAL	8.00

FOR SALE - MOVEMENTS - NEW

NO SERVICE CHARGE

3¾ ligne Baguette-FF 59 (Replaces Bulova 3AL-AN-AB), high grade finish	$22.50
5½ ligne AS 1012 (Replaces Bulova 5 AB-Wittnauer 5W-Benrus AE)	16.00
6¾ ligne Round—AS 969 (Replaces Bulova 6 AL)	18.75
FF 120 (6x8)	10.00
AS 976 (5L)	12.50
AS 970 (8¾L)	10.00

Incabloc $1.50 extra

* FOR SALE - RAILROAD WATCHES

"$1.00 Service Charge On These Items"

Prices Include Movement, Original Dial, G.F. RR Case

Movements have shiny plates in perfect condition, need only a cleaning to make them good as new. Each case refinished like new.

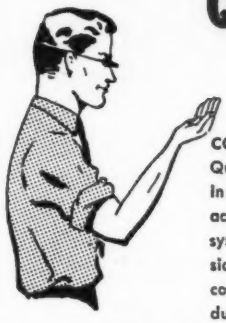
21J Hamilton 992	$22.50
21J Hamilton 992-B	35.00
21J Elgin-late durapower Model	31.00
21J Elgin-B. W. Raymond	26.00
RR Movement Only—Deduct	5.00

Write for our circular containing a complete listing of new and used movements, as well as full description of our wide range of watch and clock services and material.

Bonded Messenger Service

P. O. Box 13 White Plains, N. Y.

Quick Fit STAFF and STEM ENVELOPE SYSTEMS



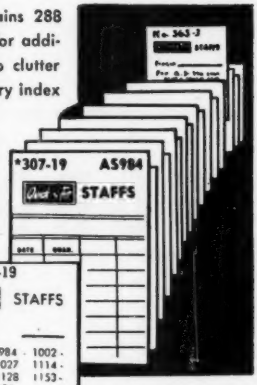
QUICK selection perfect FIT

CONVENIENT EXPANSION — Quick Fit Swiss Staff and Stem systems in envelopes are the last word for fast, accurate selection. Works like a file system with plenty of room for expansion — no rearranging of bottles or boxes for additions. Envelopes are convenient size for handling and show complete interchangeability . . . no duplicate stock.

REFILLS ALWAYS AVAILABLE — All Swiss Staffs and Stems are available in these convenient envelopes for refills or additions to your system. Envelope only need be used until original contents are consumed, and then is replaced. Material is packed in an inner waxed envelope for protection against moisture and rust—an exclusive Quick Fit feature.

ONLY NEEDED INDEXES — Original assortment shown below contains 288 indexes for the best numbers and 300 unnumbered indexes for additional new numbers . . . a total of 1176 indexes. No need to clutter cabinet with numbered indexes which may never be used. Every index card is printed for inventory control.

CONVERT YOUR PRESENT SYSTEM—You can convert your present system by simply looking up correct number on chart or in the 1952M Quick Fit catalog (available from your jobber) and place material in proper envelope. Extra envelopes are provided for numbers not in assortment.



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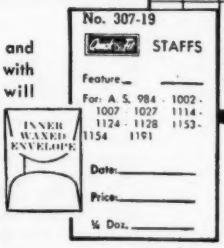
BUY NOW — SAVE FURTHER EXPENSE

Start saving time now and put your stock in order with this combination which will never become obsolete.

No. 60-333M — One each of 144 numbers of STAFFS and one each of 144 numbers of STEMS in 2-drawer Standard Steel Stack-up cabinet $39.60.



Envelope 1¾" x 2¾"

Contains most used numbers servicing the best calibers of A. Schild, Font, Eta, Unitas, Kurth, Bulova, Benrus, etc.

Order from your Jobber, TODAY.

HAMMEL, RIGLANDER & CO., INC. NEW YORK 16, N. Y.

HOROLOGY'S BEST

SAUNIER'S "Treatise on Modern Horology" was for many years a collector's item and sold for as high as $75 a copy. It has now been reprinted and is available to the trade for only $12.50. Considered the most complete horological volume ever printed, the book contains 844 pages plus index and is profusely illustrated with tables and drawings in color. No horological library is complete without this great book.

$12.50 plus 25c postage

A. H. & J. BOOK DEPT.

P. O. Box 7127
Capitol Hill Station
Denver 6, Colorado

The American horologist and jeweler Incorporating Horology

Volume 20 January, 1953 No. 1

Sizing of Wheels and Pinions

By W. B. Learned

Part 1

UPON the proper sizing of wheels and pinions, together with the correct form of teeth, largely depends the fine performance of the watch in which they are placed, as ever so finely finished a watch, with a poor train, can but be a constant source of trouble and annoyance to every one brought in connection with it, manufacturer, dealer, owner or repairer.

Charles Frodsham, in his "Elements of Watch and Clock Making," very wisely remarks that "the perfecton of every watch or chronometer lies in the judgment and ability of the watchmaker to combine the several parts into one harmonious whole."

Let it not for a moment be understood that the *train* is the most important feature of a good watch, but with a *perfect* balance, balance spring and escapement, the best results cannot be obtained unless the power of the main spring can be properly transmitted through the train to these most important factors.

In another place in the same article Frodsham says: "The sizing of wheels and pinions is an operation of daily requirement, and of the utmost importance in the production of good results." And again: "In paying attention to the *sizing* of wheels and pinions, we must give *equal* attention to the form of the teeth, or however correct the size, we shall not effect good gearing."

Editor's Note: W. B. Learned, one of the most notable horologists of his time, was especially distinguished for his ability to teach the subject of horology in a clear, simple and easily understood manner. This article on sizing wheels and pinions was published in Learned's Handbook near the turn of the century.

Definitions

As this work is more particularly intended for beginners, or apprentices, rather than for finished workmen, it may be well to use a portion of our space in giving the proper definitions of some of the terms to be used, in order that they may have a full understanding of the meaning of them, as well as to have them convenient to be referred to as needed.

It is perhaps unnecessary for me to say that a

WHEEL—Is any circular piece of metal on the periphery of which teeth may be cut of various forms and numbers; while a

PINION—Is a smaller wheel, usually termed pinion, with teeth or leaves play-

WAKMANN WATCH WAYS

Where Shine the Brightest Stars

By Icko Wakmann

It is night, and I sit by the fireside in my study. It is the first minute of 1953. It is, for most people, only a new number, taking the place of an old number; but to me, a new year is far, far different. Perhaps this is so because I am a grandfather. Those of you who are grandfathers know this feeling, and those of you who are yet to be grandfathers will know it, in time.

When I look at my grandchildren, and remark how they grow from year to year, I see in their eyes an image of myself. I see myself, so many years ago, looking into the eyes of my own grandfather. There was wisdom in his eyes, and kindness, and love —but not the anticipation, not the shining wonder, that you observe in the eyes of the young.

You seldom find this anticipation, this sparkle, in the eyes of adults. Adults, you see, are grown-up. Yet try as they will, they sometimes cannot hide it. Particularly with the coming of the new year, do the stars once more shine in the eyes of adults.

What will 1953 bring us? It will bring, for all of us, an entry into a new life—new experiences, new problems, new triumphs. And it will also bring, for you, all the cooperation I can give to a good friend. It will bring you new Wakmann models that will make money for you. It will bring you models that will make your customers' eyes light up with eagerness, with excitement. You will see this happen, month after month, as the Wakmann family of watches grows.

I pause now to send you my company's warmest good wishes for a prosperous New Year—and through you, I send the same wishes to your customers. Above all, I send you, personally and deeply from my heart, the hope that 1953 will be a happy —a very happy—New Year!

Icko Wakmann
15 W. 47th St. NYC

"The Only Incabloc Watch With the One Year Repair Policy"

ing in connection with a larger wheel.

PITCH CIRCLE—A circle concentric with the circumference of a toothed wheel, and cutting its teeth at such a distance from their points as to touch the corresponding circle of the pinion working with it, and have with that circle a common velocity, as in a rolling contact.

For example, imagine two circles to represent the wheel and pinion, at their pitch circles, the outside, or dotted line, representing the points of the teeth or full diameter.

These circles should be so placed in relation to each other than when one is revolved—both being on their centers—the other should revolve with it by frictional contact.

PITCH DIAMETER—The diameter of each of these circles is called the pitch diameter.

FULL DIAMETER—The diameter measured from point to point of teeth is called the full diameter.

DISTANCE OF CENTERS—The distance measured on a straight line from center to center, between the wheel and pinion, is called the distance of centers, and should be measured very accurately, as on this measurement the entire success of all calculations for a train of wheels depends.

LINE OF CENTERS—A line drawn from center to center of any wheel and pinion, at which the two acting points should meet.

CIRCULAR PITCH*—The pitch circle divided into as many spaces as there are teeth on wheel or pinion.

DIAMETRICAL PITCH—The *diameter* of the pitch circle, divided into as many spaces as there are teeth on wheel or pinion.

ADDENDA—The portion of the tooth, either on wheel or pinion, outside of the pitch circle, is called the "addenda" or "working depth."

DRIVER—Usually the wheel or the one that forces the other along.

---

*†You will observe that the circular pitch and the diametrical pitch are one and the same, except that one is the division of the circle, and the other the division of the diameter, each division indicating a tooth and a space.

DRIVEN—Usually the pinion or the one that is being forced.

Proportion of Addenda

WHEEL AND PINION

These proportions allude to the "time train." For the "dial train" other proportions are used (See dial train.) There seems to be some diversity of opinion, although very slight, among celebrated horologists in relation to the amount, as well as in the division of this addenda, as divided between driver and driven.

Arnold recommends two and one-quarter (2.25) to the driver, and one and one-half (1.50) to the driven, making a total of three and three-quarters (3.75), while Frodsham, although using the same amount (3.75) divides it a little differently, by giving two and one-half (2.50) to the driver and but one and one-quarter (1.25) to the driven. Many others claim that while Frodsham's rule is the better of the two for the driver, it is hardly sufficient for the driven, consequently they have adopted a total of *four* (4.00), dividing it thus: For the driver two and one-half (2.50), using Frodsham's rule for that, while they use Arnold's for the driven, viz., one and one-half (1.50). I have, however, given the preference to Frodsham, and adopted his rule, feeling that it is better to err in favor of having the driven a trifle small, rather than a little large.

To the dial train Frodsham gives to cannon pinion, as driver, two and one-quarter (2.25) "diametrical pitches," and to minute wheel, as driven, one and one-half (1.50), the same amount and proportion that Arnold gives to the time train, while to hour wheel he gives two and one-half (2.50), and to minute pinion one and one-half (1.50), making a total of four (4.00), the same amount and proportions mentioned as used by some for time train. In stem-winding watches, where the setting of the hands is operated through the setting train, and in that case the *drivers,* at times become the *driven,* it is thought best that the proportions should be equal, thus giving two (2.00) to each, driver and driven.

Gearing

To those not familiar with gearing in general it may be well to state that the pitch circle of driver, together with the curve of the addenda outside said circle, does the work of forcing the driven along, and should be of such a form as to work easily and freely, with a continuous pressure until another tooth comes into operation on the line of centers. On the other hand the curve of the driven is "more for ornament than use," and as far as the action is concerned, might as well be cut off a little outside the pitch circle, and rounded over a trifle to prevent butting. The pitch circle of the tooth on driver, should not come into action with the driven until the line of centers is reached. The thickness of the teeth in the driver should be such as to give them perfect freedom when between the leaves of the driven and pointing to center, yet not so much as to give any lost motion, while it may be said of the driven that the leaves must not be so thick as to cause any bind in the space between the teeth of the driver when pointing to its center. In fact there should be a very little shake in both. Care must also be taken that the curve outside the pitch circle of the driver is not so long as that the point of the tooth shall strike the pinion at the root or bottom of the leaves.

Epicycloidal Curve

The epicycloidal curve is considered to be the most perfect working curve for the teeth of drivers, and there is no doubt that in all cases where there is plenty of room, it is all that is claimed for it, but the difficulty in using it for such small gearing as watch trains is, that the curve of the tooth on the driver is so long from the pitch circle to the point, that in such small pinions it is almost impossible to make the depth of the cut from the pitch circle to the root of the tooth, sufficiently deep to give the necessary clearance without cutting into the staff, or making the staff of the pinion so small as to be extremely weak. The nearer we can approach this curve however, and avoid the difficulties mentioned, the more perfect will be the train.

As before mentioned, it will not be necessary to follow this curve for the pinion. Any curve to suit the eye may be used, but great care should be taken to

keep the pitch circle at its correct diameter, or the proper depthing may be destroyed.

Proportion of Wheel to Pinion

The proportion of wheel to pinion must be, as the number of teeth contained in wheel and pinion, and size of each, is to the distance of centers, within which they are to run.

The rule is universal, that whatever the number of teeth in wheel and leaves in pinion, and whether the ratio be whole or fractional, they must each have their proportionate part of the distance of centers. If a wheel is to have 60 teeth and a pinion 10 leaves, then the distance of centers must be divided between them, in this case, six to one, or six parts for the radius of the wheel, and one part of the radius of the pinion. For instance, sixty teeth divided by ten equals six, ten leaves divided by ten equals one, or one part of the distance of centers, using a common divisor. for both. It follows, therefore, that this distance of centers must be divided into *seven* equal parts or portions, giving to each its proper share. If the wheel is to have 75 teeth and the pinion 10 leaves, then the distance of centers must be divided into eight and one-half parts, giving to wheel seven and one-half parts, and to pinion one part.

Figuring Trains

Having given these necessary definitions and explanations so that the student may understand what may follow, we will proceed to explain in the same simple manner the *modus operandi* of figuring a train of wheels and pinions for a watch beating 18,000 times an hour, running thirty-eight hours, with one winding, on five turns of the stop work.

The question may be asked, how is the number of teeth in wheels and leaves in pinions to be determined, or decided upon and why should the fourth wheel contain more teeth than the third wheel, which is the larger of the two? To many this may seem a very foolish question but they must remember that *they* at some period of their apprenticeship probably asked *many* just such foolish questions and also remembering that this work is *particularly* intended for beginners, I trust they will pardon the intrusion, and if they do not care to read it, they can pass it over as lightly as they please. The answer is this: In all watches denoting seconds, the fourth pinion must be made to revolve sixty times to one revolution of the center pinion, which revolves once every hour. Such numbers of teeth must therefore be used as will accomplish this result, and any numbers that *will* accomplish it will be found to be correct.

Before we can show the manner of procedure we must decide upon a train of wheels and pinions that we wish to obtain the dimensions of. Suppose for this purpose we take the following:

Main wheel of 76 teeth, center pinion 10 leaves.

Center wheel of 80 teeth, third pinion 10 leaves.

Third wheel of 75 teeth, fourth pinion 10 leaves.

Fourth wheel of 80 teeth, escape pinion 8 leaves.

The center distances we will imagine to be as follows, viz.:

Main to center, .450; center to third, .323; third to fourth, .272; fourth to escape, .243. As but one-half of the diameter of each wheel and pinion is contained within the given distance of centers and we are to determine the pitch diameter of each, it becomes necessary for us to first multiply this distance by two and divide the quotient by the sum of the teeth in wheel and leaves in pinion which will give us the "diametrical pitch." We will proceed first with the main and center. Example 1 (with explanations):

Main wheel, 76 teeth, } Distance of
Center pinion, 10 leaves, } center, .450

86

.450
2

86).900(.010465—Diametrical pitch.
86

400
344

560
516

440
430

10

Having obtained this "diametrical pitch," we will proceed to obtain the necessary "addenda" for the wheel. This, you will remember, is to be two and one-half (2.5) diametrical pitches, therefore, diametrical pitch, multiplied two and one-half times equals addenda of wheel.

```
.010465
   2.5
-------
 052325
020930
-------
.0261625 Addenda for wheel.
```

The "pitch diameter" of the wheel must be as many "diametrical pitches" as there are teeth on the wheel, therefore, the diametrical pitch multiplied by number of teeth, as

```
.010465
    76
-------
 062790
 73255
-------
.795340=Pitch diameter.
```

giving us, therefore, a main wheel with a "pitch diameter" of .795340.

Now to obtain the "full diameter" we must add the "pitch diameter" and the "addenda" together, being very careful to place the decimals one under the other correctly, thus:

Pitch diameter of wheel,	.795340
Addenda,	.0261625
Full diameter of main wheel,	.8215025

We will now proceed in the same manner to obtain these two diameters for the pinion, which must have *ten* "diametrical pitches" for its "pitch diameter," with the proper "addenda" added, for its "full diameter."

Diametrical pitch .010465 multiplied by number of leaves 10 results in

.104650

giving us a pitch diameter for pinion of .104650. Now proceed to obtain the "addenda" for pinion. This you will remember is to be one and one-quarter (1.25) "diametrical pitches," therefore

```
.010465
   1.25
-------
 052325
020930
010465
-------
.01308125=Addenda to pinion.
```

This added to pitch diameter .10465
Addenda .01308125

gives us a full diameter .11773125

Now let us try and prove our work and see if we have done it correctly. If we have, by adding the two pitch diameters together, and dividing the quotient by two, we shall have as a product the "distance of centers."

Pitch diameter of wheel, .795340
Pitch diameter of pinion, .104650

2).899990

Distance of centers, .449995

You will notice that I have carried these products out to the extent of six, or even in some cases, to eight decimals, and yet have failed to obtain the *exact* figures. This comes from the fact that we did not carry our figuring out far enough to obtain a quotient *without a remainder*. Had we done so, the result would have come out just right, viz.: .450.

In figuring for a train, the nearer you can come to a product without a remainder, the closer you can prove your work, but in actual measurements, such as in diameters, center distances, etc., you will only be expected to obtain the nearest thousandth (three decimals). For instance, take the two pitch diameters just obtained, first of the wheel .795,340. As the fourth figure in the decimal is less than 5 or one half, you may with safety call it .795, while, with the pinion, .104,650, the fourth figure being more than 5, I should advise giving the benefit to the preceding figure, calling it .105, for the pitch diameter of the pinion.

Having given the first example, and explanations in detail, so that the beginner may receive the explanation with the figures, I will proceed to give the same example "en mass":

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EXAMPLE I
(Without explanations)

Main wheel, 76 teeth, } Distance of
Center pinion, 10 leaves, } centers, .450

86
.450—Distance of centers.
2

Sum of teeth, 86)900(.010465—Diamet. pitch.
86

400
344

560
516

440
430

10

.010465
2.5

052325
020930

.0261625 Addenda for wheel.

.010465
76 Teeth in main wheel.

062790
073255

.795340 Pitch diameter of main wheel.
.0261625 Addenda of main wheel.

.8215025 Full diameter of main wheel.

.010465
1.25

052325
020930
010465

.01308125 Addenda for pinion.

.010465
10 Teeth in center pinion.

.104650 Pitch diameter of center pinion.
.01308125 Addenda for center pinion.

.11773125 Full diameter of center pinion.

The result shows as follows:

Pitch diameter main wheel,	.795340
Full diameter,	.8215025
Pitch diameter center pinion,	.104650
Full diameter,	.11773125

Next in course come center wheel and third pinion, which require the same method of procedure.

Center wheel, 80 teeth, } Distance of
Third pinions, 10 leaves, } centers, .323

90=Sum of teeth.

.323 Distance of centers.
2

90) .646 (.007177 + = Diametrical pitch.
630

160
90

700
630

700
630

70

.007177=Diametrical pitch.
2.5

035885
014354

.0179425=Addenda of wheel.

.007177
80 Number of teeth in wheel.

.574160 Pitch diameter of wheel.
.1079425 Addenda of wheel.

.5921025 Full diameter of wheel.
.007177=Diametrical pitch.
1.25

035885
014354
007177

.00897125 = Addenda of pinion.
.007177 = Diametrical pitch.
10 Number of leaves in pinion.

.071770 Pitch diameter of pinion.
.00897125 Addenda of pinion.

.08074125 Full diameter of pinion.

PROOF
.574160 Pitch diameter of wheel.
.071770 Pitch diameter of pinion.

2) .645930

.322965=Distance of centers.

The result shows as follows:

Pitch diameter of center wheel, .57416
Full diameter, .5921025
Pitch diameter of third pinion, .07177
Full diameter, .08074125

Following in course come the third wheel and fourth pinion.

Third wheel, 75 teeth, } Distance of
Fourth pinion, 10 leaves, } centers, .272

85

.272
2

Sum of teeth, 85).544 (.0064 Diamet. pitch.
510

340
340

.0064
2.5

0320
0128

.01600 Addenda for wheel.

.0064
75

0320
0448

.4800 Pitch diameter of third wheel.
.0160 Addenda.

.4960 Full diameter of third wheel.

.0064
1.25

0320
0128
0064

.008000 Addenda for pinion.

PROOF
.4800
.0640

2) .5440

272 Distance of centers.

.0064
10

.0640 Pitch diameter of fourth pinion.
.0080 Addenda.

.0720 Full diameter of fourth pinion.

This result shows as follows:

Pitch diameter of third wheel, .4800
Full diameter, .4960
Pitch diameter of fourth pinion, .0640
Full diameter, .0720

Now comes the last of the time train, viz., the fourth wheel and escape pinion.

Fourth wheel, 80 teeth, } Distance of
Escape pinion, 8 leaves, } centers, .243

88
.243
2

Sum of teeth, 88) .486 (.005522—Dia. pitch.
440

460
440

200
176

240
176

64

.005522
2.5

027610
011044

.0138050 Addenda for wheel.

.005522
80

.441760 Pitch diameter of fourth wheel.
.013805 Addenda.

.455565 Full diameter of fourth wheel.

.005522
1.25

027610
011044
005522

.00690250 Addenda for pinion.
PROOF
.441760
.044176

2) 485936

.242968 Distance of centers.

.005522
8

.044176 Pitch diameter of escape pinion.
.0069025 Addenda.

.0510785 Full diameter of escape pinion.

This result shows as follows:

Pitch diameter for fourth wheel,	.44176
Full diameter,	.455565
Pitch diameter for escape pinion,	.044176
Full diameter,	.0510785

Before taking up the dial train, and while the escape pinion is fresh in our mind, it may be well to spend a little time on the following:

Remarks on an Eight Leaf Pinion

It is conceded by the best horologists that an eight leaved pinion, especially as *small* a pinion as is required in a watch train, is a very difficult one to so cut that it will run perfectly free with the fourth wheel, having the usual addenda, as the point of the incoming tooth of the wheel is very liable to touch, or lodge, on the pitch line of the next approaching leaf of the pinion, particularly so, if the leaves of the pinion are a *very trifle* thick.

The writer has found, in his own experience, several cases where the watch would stop, occasionally, without any apparent provocation, and on the slightest jar start to running again, leaving it quite a little behind time, yet when noticed would be running as usual. In most cases of this kind, it has occurred while the watch was standing on the rack, or hanging on the watch board. After much trouble and annoyance in hunting for the cause, it was found to be, not from an over sized wheel or pinion, but from the very cause mentioned, viz., the point of the incoming tooth of the fourth wheel was caught on the pitch line of the incoming leaf of the escape pinion, causing the tooth and leaf to *"butt"* together just enough to *occasionally* stop the watch. This *might* have occurred from the cutter being a little thin in the first place, but in that case, *all* the pinions cut, with that cutter, would have had the same trouble, and all watches having that lot of pinions in them would have been similarly affected. As it was only *occasionally* that this throuble was found, it is but fair to suppose that it came from the wearing of the cutter, which had been used a little too long, and should have been taken for a *first* cutter or thrown away. It may seem strange to those not acquainted with the manufacture of watch pinions, when they are informed that however good a cutter you may have, the number of pinions you can cut with it, and have them perfect, is quite limited. The sides of the cutter, as well as the point, are constantly wearing and, of course, as they wear, the space between the leaves is constantly growing narrower, and the leaf thicker. The point can be sharpened by grinding back the face, but the sides can never be touched after the cutter is first made and hardened, consequently, great care should be taken to see that it is not used too long, and the leaf allowed to grow too thick.

Knowing, then, the natural difficulty with an eight leaved escape pinion, together with this constant wear of the cutter, the writer, having tried it thoroughly, and adopted it himself, would recommend the lessening of the addenda of the fourth wheel a very little, being of course, *very* careful to keep the pitch circle at its proper size.

In trying this experiment, I took *two* "diametrical pitches" for the fourth wheel, instead of two and one-half, and in order to show the *very* slight difference it makes in the full diameter of the wheel, I will proceed to figure the fourth wheel and escape pinion, same as before, with the exception of the addenda.

Fourth wheel, 80 teeth, } Distance of
Escape pinion, 8 leaves, } centers, .243

88
.243
2

Sum of teeth, 88) .486 (.005522—Dia. pitch.
440

460
440

200
176

240
176

64

.005522
2

.011044 Addenda for wheel.

.005522
1.25

027610
011044
005522

.00690250 Addenda for pinion.

.005522
80

.441760 Pitch diameter of fourth wheel.
.011044 Addenda.

.452804 Full dia. fourth wheel.

.005522
8

.044176 Pitch diameter of escape pinion.
.0069025 Addenda.

.0510785 Full diameter of escape pinion.

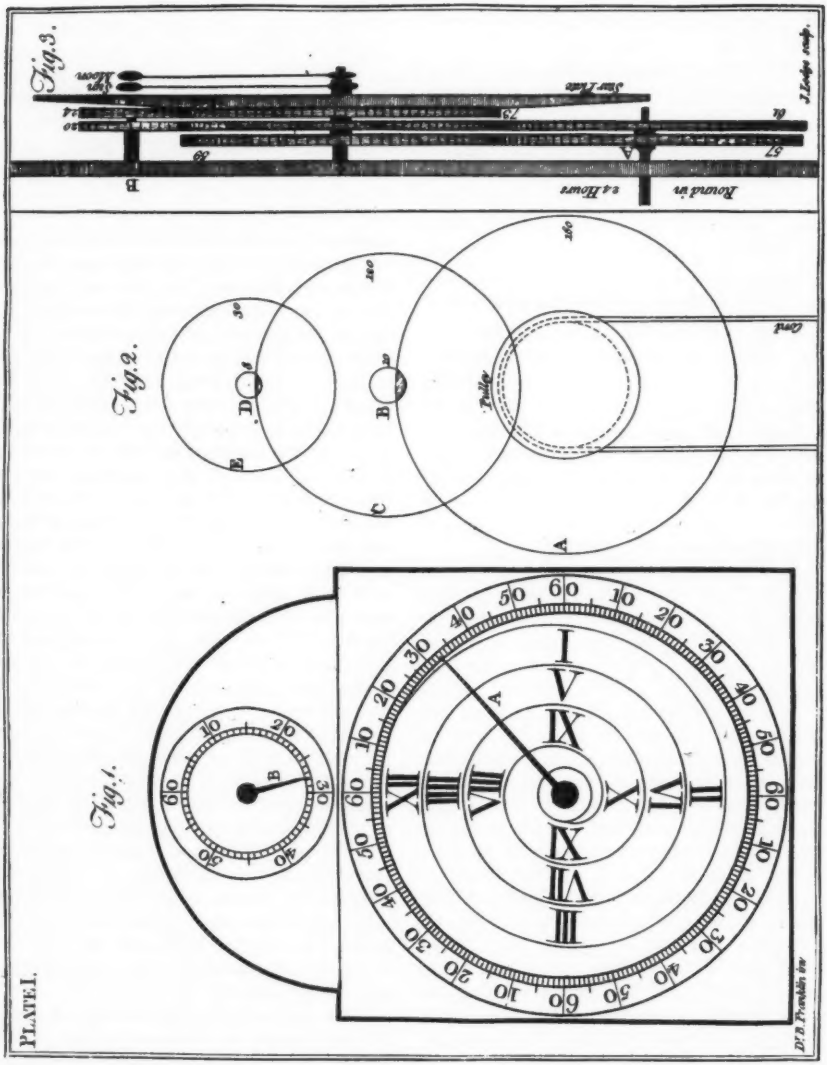
It will be observed on comparison, that every set of figures, and their results, are precisely the same, except the addenda and the full diameter of the wheel, which is only about one one-thousandth smaller on the side in action, and yet it was all that is required, unless the leaf is out of all proportion to the space.

In my own experience, after making this change, I had no further trouble, neither could I observe any difference in the performance of the watches, except that they never stopped afterwards, or gave any trouble whatever. While on this subject of the escape pinion, let me speak of another matter connected therewith, and relate a little experience of my own, which *may* be of benefit to repairers, and save them more or less trouble. This relates more particularly to the care which should be exercised in the examination of watches, before repairing them. Let me therefore caution the repairer, especially if he be a young workman, to be *very* sure when he examines a watch for repairs, to look at every part very carefully to see that there are no worn parts that would be likely to cause trouble when the watch is cleaned, and put up ready for use. Among other things, be very careful to examine the escape pinion just where the tooth of the wheel impinges the side of the leaf, to see if the leaf is *worn* at that point, for if it is, he might just as well make up his mind that he must put in a new pinion, if he wishes to avoid much trouble and annoyance, for in nine cases out of ten, if he leaves it in he will never be able to get the watch to run at all satisfactorily, and his customer will be constantly complaining.

The writer distinctly remembers one case in particular, in my early experience as a repairer, when a very *crusty* old gentleman, who owned a very fine Frodsham watch, came into the store where I was at work, and handing me the watch, which was then running, asked me what was the matter with it, at the same time making the remark that "he did not believe these *damned watchmakers* knew their business, anyhow, for he had had that watch in the hands of several of the best watchmakers in the city, and none of them had succeeded in repairing it so but that it would stop every once in a while, and then get to running again in his pocket without his knowing when it stopped, or that it was stopped at all, except that when he took it out of his pocket to look at the time he would find it some minutes behind time, and it would be *sure* to occur just before he was expecting to take a train, and the consequences would be he would get left." When he informed me of the firms who had had the watch, and knowing that they employed some very fine workmen, I felt very much disinclined to tackle it, but finally told him I would take it down and examine it, and if I thought I could repair it so it would perform satisfactorily, I would do so, and he need not pay for it until he was entirely satisfied with its performance. This seemed to please him very much, and he left it with me. Suffice it to say I repaired it by putting in a new escape pinion (which I found worn in the leaves at the point mentioned), cleaning, etc., and never after did it give him any further trouble. The result was, he not only paid me well for it, but he sent me many customers by relating the incident to his friends.

I do not mention this incident to give the impression that I was any *better* watchmaker, if as good, as those who had repaired it before, but only with the idea of impressing upon the mind of the beginner the necessity of being *thorough* and conscientious in their work. First, find out what there is to *cause* trouble, and then remove the cause.

(Concluded Next Month)



FRANKLIN'S CLOCK

Clockmakers of the Past . . .

FERGUSON *versus* FRANKLIN

• • •

Editor's Note: Many great men contributed to the shaping of the history-making days of the late Eighteenth Century; among them were two of most considerable stature — Benjamin Franklin of the United States and James Ferguson of Scotland. Their lives were somewhat parallel; both began life in humble station, both possessed inventive and creative minds, both were mostly self-taught, they were unsurpassed in their struggles for human endeavor, and each of the two was stamped with the mark of genius.

Horology was responsible for a peculiar coincidence in the lives of these gifted men. Franklin invented a clock, and Ferguson, with some apology, ventured an improvement on it. The following is taken from a rare book called "Select Exercises", written by Ferguson in 1773.

• • •

A Clock Shewing the Hours, Minutes, and Seconds, having only three Wheels and two Pinions in the whole Movement. Invented by Dr. FRANKLIN *of* Philadelphia.

Benjamin Franklin

THE dial-plate of this clock is represented by Fig 1 of Plate 1. The hours are engraven in spiral spaces, along two diameters of a circle containing four times 60 minutes. The index *A* goes round in four hours, and counts the minutes from any hour it has passed by, to the next following hour. The time, as it appears in the figure, is either 32½ minutes past XII, or past IIII, or past VIII; and so on, in each quarter of the circle, pointing to the number of minutes after the hours the index last left in its motion. Now, as one can hardly be four hours mistaken in estimating the time, he can always tell the true hour and minute, by looking at the clock, from the time he rises till the time he goes to bed. The small hand *B*, in the arch at the top, goes round once in a minute, and shews the seconds, as in a common clock.

Fig. 2 shews the wheel-work of this clock. *A* is the first or great wheel, it contains 160 teeth, goes round in four hours, and the index *A* (Fig. 1) is put upon its axis, and moved round in the same time. The hole in the index is round, it is put tight upon the round end of the axis, so to be carried by the motion of the wheel, but may be set at any time to the proper hour and minute, without affecting either the wheel or its axis. This wheel of 160 teeth turns a pinion *B* of 10 leaves; and as 10 is but a 16th part of 160, the pinion goes round in a quarter of an hour. On the axis of this pinion is the wheel *C* of 120 teeth; it also goes round in a quarter of an hour, and turns a pinion *D*, of 8 leaves, round in a minute; for there are 15 minutes in a quarter of an hour, and 8 times 15 is 120. On the axis of this pinion is the *second-hand B* (Fig. 1) and also the common wheel *E* (Fig. 2) of 30 teeth, for moving a pendulum (by pallets) that vibrates seconds, as in a common clock.

James Ferguson

This clock is not designed to be wound up by a winch, but to be drawn up like a clock that goes only 30 hours. For this purpose, the line must go over a pulley on the axis of the great wheel, as in a common 30 hour clock. Several clocks have been made according to this ingenious plan of the Doctor's; and I can affirm, that I have seen one of them, which measures time exceedingly well. The simpler that any machine is, the better it will be allowed to be, by every man of science.

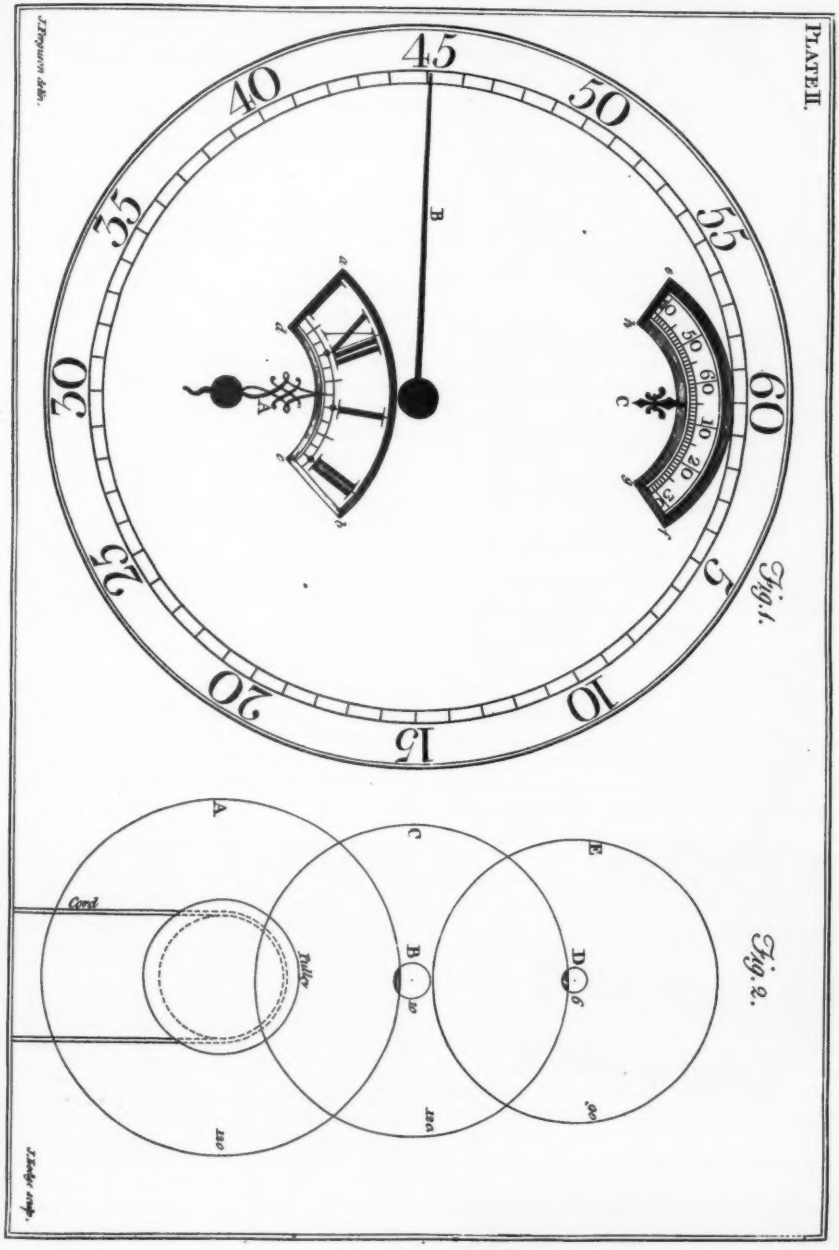
* * *

Another Clock that Shews the Hours, Minutes, and Seconds, by means of only three Wheels and two Pinions in the whole movement.

As Dr. FRANKLIN, whom I rejoice to call my friend, is perhaps the last person in the world, who would take any thing amiss that looks like an amendment or improvement of any scheme he proposes, I have ventured to offer my thoughts concerning his clock, and how one might be made as simple as his, with some advantages. But I must confess, that my alteration is attended with some inconveniences, of which his are entirely free. I shall mention both, to the best of my knowledge, that they who chuse to have such simple and cheap clocks may have them made in either way they please.

The Doctor's clock cannot well be made to go a week without drawing up the weight; and if a person wakes in the night, and looks at the clock, he may possibly be mistaken four hours in reckoning the time by it, as the hand cannot be upon any hour, or pass by any hour, without being upon or passing by four hours at the same time. To avoid these inconveniences, I have thought of the following method.

In Fig I of Plate II the dial plate of such a clock is represented; in which there is an opening *a b c d* below the center. Through this opening, part of a flat plate appears, on which the twelve hours are engraved, and divided into quarters. This plate is contiguous to the back of the dial-plate, and turns round in 12 hours; so that the true hour, or part thereof, appears in the middle of the opening, at the point of an index *A*, which is engraved on the face of the dial-plate.—*B* is the minute-hand, as in a common clock, going round through all the 60 minutes on the dial in an hour; and, in that time, the plate seen thro' the opening *a b c d* shifts one hour under the fixt engraven Index *A*. By these, you always know the hour and minute, at whatever time you view the dial-plate.—In this Plate is another opening *e f g h*, thro' which the seconds are seen on a flat movable ring, almost contiguous to the back of the dial-plate; and, as the ring turns round, the seconds upon it are shewn by the top-point of a *fleur-de-lis C*, engraved on the face of the dial-plate.



FERGUSON'S CLOCK

Fig. 2 represents the wheels and pinions in this clock. *A* is the first or great wheel; it contains 120 teeth, and turns round in 12 hours. On its axis is the plate on which the 12 hours above mentioned are engraved. This plate is not fixed on the axis, but is only put tight upon a round part thereof, so that any hour, or part of an hour, may be set to the top of the fixed index *A* (Plate 1) without affecting the motion of the wheel. For this purpose, twelve small holes are drilled through the plate, one at each hour, among the quarter divisions; and, by putting a pin into any hole in view, the plate may be set, without affecting any part of the wheel-work. This great wheel *A*, of 120 teeth, turns a pinion *B* of 10 leaves round in an hour; and the minute-hand *B* (Fig. 1) is on the axis of this pinion, the end of the axis not being square, but round; that the minute-hand may be turned occasionally upon it, without affecting any part of the movement. On the axis of the pinion *B* is a wheel *C* of 120 teeth, turning round in an hour, and turning a pinion *D* of 6 leaves in 3 minutes; for 3 minutes is a 20th part of an hour, and 6 is a 20th part of 120. On the axis of this pinion is a wheel *E* of 90 teeth, going round in 3 minutes, and keeping a pendulum in motion that vibrates seconds, by pallets, as in a common clock, where the pendulum wheel has only 30 teeth, and goes round in a minute.—But, as this wheel goes round only in 3 minutes, if we want it to shew the seconds, a thin plate must be divided into 3 times 60, or 180 equal parts, and numbered 10, 20, 30, 40, 50, 60; 10, 20, 30, 40, 50, 60; 10, 20, 30, 40, 50, 60; and fixed upon the same axis with the wheel of 90 teeth, so near the back of the dial-plate, as only to turn round without touching it; and these divisions will shew the seconds, thro' the opening *e f g h* in the dial-plate, as they slide gradually round below the point of the fixed *fleur-de-lis* C.

As the great wheel *A*, and pulley on its axis over which the cord goes (as in a common 30 hour clock) turns round only once in 12 hours, this clock will go a week with a cord of common length, and always have the true hour, or part of that hour, in sight at the upper end of the fixed index *A* on the dial-plate. These are two advantages it has beyond Dr. *Franklin's* clock; but it has two disadvantages of which his clock is free. For, in this, although the 12 hour wheel turns the minute-index *B*, yet, if *that* index be turned by hand, to set it to the proper minute for any time, it will not move the 12 hour plate to set the corresponding part of the hour even with the top of the index *A*; and therefore, after having set the minute-index *B* right by hand, the hour-plate must be set right by the means of a pin put into the small hole in the plate just below the hour. 'Tis true, there is no great matter in this; but I have some suspicion that the pendulum wheel *E* having 90 teeth instead of the common number 30, may be some disadvantage to the escapement, on account of the smallness of the teeth; and 'tis certain, that it will cause the pendulum-ball to describe but small arcs in its vibrations. Indeed some men of science think small arcs are best; but if they really are, I must confess myself ignorant of the reason. For, whether the ball describes a large or small arc, if the arc be nearly *cycloidal*, the vibrations will be performed in equal times; the time then depending entirely on the length of the pendulum-rod, not on the length of the arc the ball describes. The larger the arc is, the greater is the *momentum* of the ball; and the greater the *momentum* is, the less will the times of the vibrations be affected by any unequal impulse of the pendulum-wheel upon the pallets.

But the worst thing about this clock (and what every one will allow to be a disadvantage) is, that the weight of the flat ring on which the seconds are engraved, will load the pivots of the axis of the pendulum-wheel with a great deal of friction, which ought by all possible means to be avoided; and yet I have seen one of these clocks (lately made) that goes very well, notwithstanding the weight of this ring. For my own part, I think it might be quite left out; for seconds are of very little use in common clocks not made for astronomical observations; and table-clocks never have them.

* * *

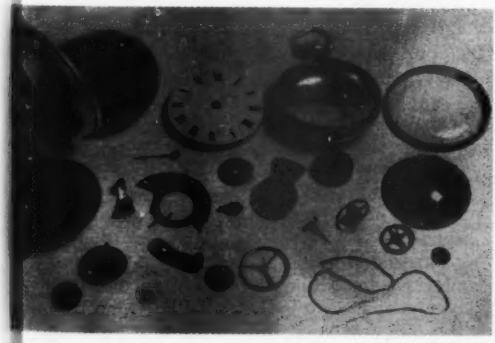
Jesse James' Watch

By BEN GRISMORE
Corydon, Iowa

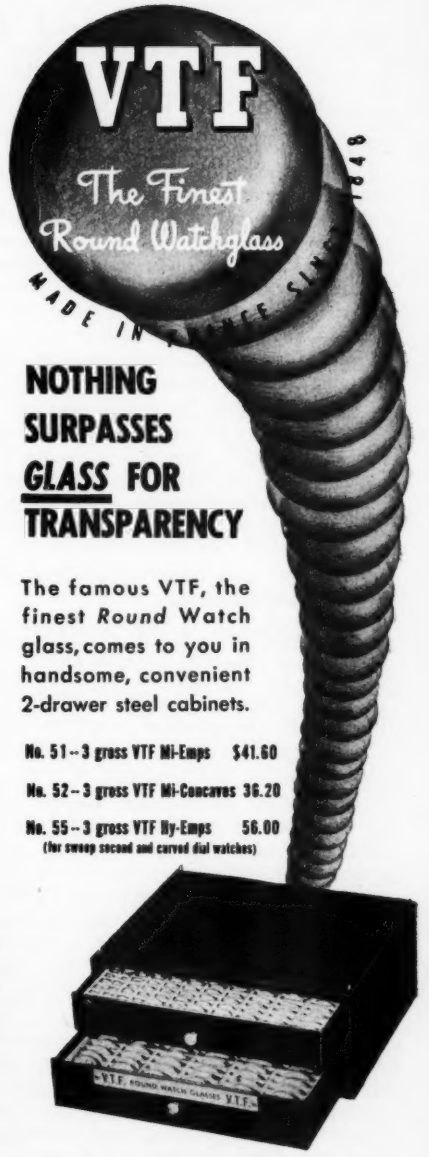
It was quite by accident that I met Henry Walker of Osceola, Iowa, and learned of the watch in his possession that reputedly once belonged to the famous outlaw Jesse James. His story of the watch was so convincing to me that I asked him if he would make the subject a program feature at a meeting of the South Central Guild.

He met with us, presented the watch and told us of its fascinating history which, briefly, ran like this: The watch was purchased from L. B. Liddy, whose father bought it from an innkeeper on a Prairie Du Chein road. Jesse James had pawned the watch to the innkeeper for a night's lodging for eight men and horses the night before the Northfield, Minnesota, bank was robbed. Although Walker knew the watch had been traced from Liverpool, England, to Smithsville, Missouri, the vicinity of James' hangout, he desired positive identification of the timepiece and in September of 1949 made a trip to Merrimac Caves where the real Jesse James was supposed to be. He returned convinced that he had talked to the real Jesse James, and that the watch once really belonged to James.

Walker is outlining proof of his claim in a book he is writing, called "Jesse James, My Friend."



This is the watch said to have been carried by Jessie James.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Time and Transportation

By Clarence Fabrin
Manager of Time Service of the Southern Pacific Railroad

TIME and transportation are inseparable, whether on sea, on land or in the air. You are familiar with the importance of a chronometer in a ship's operation, so I will not dwell on that phase. Time is also of more or less importance in the air transportation, and if we reflect but a moment, we will discover time is basic in every human endeavor.

But, in the operation of a railroad, *time is of paramount importance;* its value is of such importance that it is indispensable. Imagine, if you please, what would happen if you tried to operate a railroad without time—the confusion would be appalling, delays most exasperating and the enviable record of safe operation would be non-existent.

To begin with, time is important for the departure of trains.

It is important in the movement of trains. During any 24-hour period of operation on any railroad it is necessary for many trains to pass each other, and in order to execute these operations with a minimum of delay and with all possible safety, there must be accuracy in time.

It is not by accident that the first rule in the rules and regulations of a railroad deals with time. Over 70 years ago, with a density of traffic only a fraction of what it is today, it became evident that to operate safely, and efficiently, railroads must have a standard of time and a standard of watches. Such a standard was developed and has been rigidly maintained to the present day.

In co-operation with the American watch manufacturers a railroad watch was designed and I think you will agree it would be difficult to improve this railroad watch for accuracy and durability. It is true Patek Phillipe and Vacheron & Constantin produce watches that surpass the American watch from the artistic viewpoint, and their finish is unexcelled. It is a pleasure to admire the craftsmanship put into these movements, but for a railroad man, who is not a delicate person, by any means, a watch must be rugged and dependable and the American railroad watch meets the requirement.

To maintain accuracy of time on a railroad a reliable watch must be in the pocket of every employe whose duties are in any way connected with the movement of trains; clocks, suitably designated, must be available at proper locations for comparison of watches by employes before they commence each tour of duty, and many ordinary clocks in stations and offices which must be correctly maintained. And, by no means the least important, is the designation of watchmakers as Authorized Watch Inspectors in many railroad terminals and at other points to whom watches may be presented by employees for check and other necessary attention.

The selection of Authorized Watch Inspectors is highly important. The servicing of railroad watches demands skill above the average. With a permissible maximum variation of not more than 30 seconds per week, these watches must be given special attention when cleaned, oiled and rated. Appointments must, therefore, be made on the basis of skill wherever obtainable.

In our office in San Francisco, we provide time service for Southern Pacific and nine other rail lines. This supervision extends to watches of upwards of 18,000 employes, to determine if they comply with railroad specifications and are cleaned and oiled, by an Authorized Watch Inspector or watchmaker of employes' choice and certified by an Inspector, when the maximum period has expired; 300 Standard Clocks provided for comparison of watches and 190 Authorized Watch Inspectors.

Standard Clocks must be correct so employes when comparing with them may obtain accurate time, and for this reason they are compared daily with time signals transmitted from the Naval Observatory in Washington and set to correct time. Record is maintained of the performance of these clocks and mailed to our office

in San Francisco at the close of each month for check.

In addition, a fully-equipped clock repair shop is maintained for servicing 300 Standard Clocks periodically and maintaining in good order some 4500 types of other timepieces.

As previously mentioned, time is indispensable in the movement of trains; but, it does not stop there. Time is also highly important in every other activity on a railroad. As an illustration—locomotives, whether steam or diesel, must be serviced at terminals between time of arrival and departure, and this must be accomplished on a time schedule; many operations in the general repair shops require exact timing; temperatures must be recorded by a thermograph in the movement of perishable freight; telegrams in connection with the movement of freight, as well as passenger trains, must be time stamped. These and many other operations require such instruments as stop watches, thermographs, time stamps, watchman clocks, and the employe time recorder, impact register, time switches, office and station clocks, official railroad business car clocks and electric clock systems.

With the advent of our hurry-up age, the speed of railroad trains has been increased. The speed of a freight train some 15 or 20 years ago was 20 to 25 miles per hour; today it is 45 to 50 miles per hour. The speed of modern passenger trains is 70 to 80 miles per hour. What does this mean—simply that the need for accurate watches in the pockets of employes is more than ever important.

Now we come to a delicate question, how to maintain these watches accurately. As you all know a watch is just as dependable as the last man who worked on it. It is becoming more and more difficult to obtain competent watchmakers. And, we must have competent watchmakers to make repairs to watches so vital in the operation of a railroad. Who shall they be, and where shall we find them? We endeavor to obtain the most skilled men, but there are times when we are faced with only one man in a community.

It cannot be denied that an increasing number of incompetent workmen are creeping into our fold. This is due principally to the lack of properly trained mechanics today. Years ago one served an apprenticeship, or attended one of the few good schools, but today in some of the schools, you attend for six to 12 months and then are considered a full-fledged mechanic. I learned the hard way, apprenticeship.

I remember well my first job in a jewelry store. I came to work at 6:30 in the morning, and my day's work ended at 6:30 in the evening, and on Saturday it ended at 11 pm. That, of course, was many years ago, and I received the magnificent weekly wage of $5.00. Under a master watchmaker it was years before you were considered to be a good workman. Of course, times have brought about many changes. Today we have an almost universal 8-hour day and the 5-day week is fast becoming a reality in every industry. Believe it or not, the 5-day week is not entirely new. Robinson Crusoe was the first to observe it—he had all of his work done by Friday.

I feel certain you will agree, that many of the incompetent watchmakers today are products of so-called watchmaking schools. I wonder how one can learn watchmaking by a mail order course. These schools came into being as result of the Government's educational program, not staff. These schools make very little effort to turn out finished mechanics. Watchmakers turned out by these schools find it possible to "get by" for a while, but they soon fall by the wayside, and they and the general public suffer, and the so-called watchmaker soon finds himself a dismayed man.

For a number of years much publicity has been given to certain types of repairmen concerning the manner in which they fleece the public. A short time ago an article appeared in Readers Digest linking watch repairing with other types of gyp repair shops. This is a regrettable situation and one that in my opinion deserves much thought and consideration for improvement.

Why does any one carry a watch? Certainly not as an ornament—then it must be for a practical purpose, and that is to have the time of day. The doctor, the lawyer, the business man, the worker, including many thousands of commuters, the

housewife and even the children find time important, and are more than ever conscious of it. It is necessary in keeping appointments, getting to work and to school on time and, bless their hearts, the housewives need it in their culinary endeavors. You will say—what about the electric clock which today provides very accurate time. That is quite true, but you can't carry an electric clock with you, and must, for a good part of the day, depend upon your watches. Railroad watches when repaired receive special attention, so they will give dependable performance in all positions. But, with the ordinary pocket or wrist watch we are inclined to sometimes let well enough alone. It is my feeling that any watch that is worth repairing should be so repaired that it will perform commensurate with its construction and quality. The recollection of quality repair work remains long after the price is forgotten.

I sense that a good many watchmakers would welcome some method whereby their profession would be placed on a higher level than exists now. The optometrists, the barbers, the nurses, the cleaners, pressers and dyers and other similar professions found it necessary to seek some sort of means to bring about improved standards. This was done by registration. Watchmakers would do well to accelerate their efforts to bring about a more universal improvement and thus regain the confidence of the public. This, as has already been demonstrated, can be done without injury or working a hardship on those now engaged in watchmaking. It would be the means of bringing about improvement in the types of watchmaking schools now operating and in years to come would assure the standard of watchmaking which so many of us remember existed in days gone by. I'm sure some of you remember when the optometrists rode on the jewelers band wagon. What happened? They banded themselves until they had their program of registration put through. Now, they are almost completely divorced from the jewelry industry and certainly have the respect of the public.

Watch repairing is not a hobby but a highly skilled profession which we have to educate the public about. We should eliminate from their minds the expression, "A watch fixer or tinkerer." How can this be done? Through education and registration.

Last fall our office conducted a poll of about 150 railroad watch inspectors in the state of California with almost a complete return. The question was, "Do you favor some sort of a licensing law in California? The returns showed 8-to-1 in favor of some sort of registration. With this in mind, we selected a representative group of railroad watch inspectors from Northern California and studied the former California proposal, the Oregon and Wisconsin law, and the proposed Texas law. After some deliberation and changes, we had what we thought was an improved proposition which we thought would be acceptable. Then we had a like meeting of the Southern California watch inspectors who followed the same procedure. Our third meeting was a composite group from Northern California and Southern California, each having their own proposition to offer. We took the two revisions and from these two we still made a third. That is as far as the watch inspectors felt they should go, alone. Our next move was to invite, let us say three representatives from the California Horological Association and three or more from the C.R.J.A. to meet with a like number of watch inspectors and go over the proposition and get the reaction and suggestions and revise it once more before presenting it to the proper authorities.

That, I think, is the hope and solution of our future as watchmakers. This idea, I think, should be promoted in every state, and could be taken up by different associations, guilds, and by our journals.

Now is the time to act, once more.

The diamond cutting industry was one of the first in America to employ female workers—much to the intensive eyebrow-raising of the citizens of Boston, where the phenomenon took place. The time was the early 1870's and the firm (which was one of this country's pioneers in the field) belonged to Henry D. Morse. He couldn't talk his master cutters into training apprentices. So he undertook the job himself and insisted on selecting young ladies instead of boys and men for a couple of reasons: First, they were careful, diligent employees who tried to do their level best. Second, they were certainly far more decorative, as they worked at the wheels, than the masculine gender.

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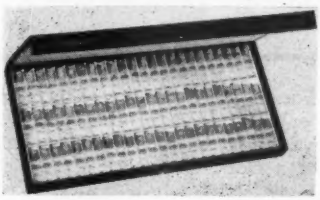

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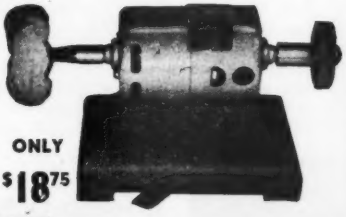

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ELM: I have a watch made by the Rockford Watch Company of Rockford, Illinois. It is an old key-wind watch in a hunting case, and the movement has serial number 68671. Could you give me the year of manufacture? It is an heirloom, but we do not know how old it is.

Answer: The Rockford Watch Company was organized at Rockford, Illinois, in 1874, and carried on business until 1896 when they failed. They went through reorganization and failed again, and went out of business in 1915. As there are no records as to when these serial numbers left the factory, we estimate the watch left the factory between 1880 and 1882. From a collector's viewpoint, it has no especial value, as there are many Rockford watches still on the market. Perhaps all you could get out of the old watch is for the value of the old gold or silver, plus a few dollars from some collector.

EEG: I do quite a bit of clock work, and every now and again I find worn pinions. They seem to be undersize or oversize, and as I don't understand or know how to calculate for the correct diameter of the pinion, perhaps you have some simple shop formula that would be helpful. Any help you can give will be appreciated.

Answer: When you have a wheel and the diameter of the pinion is required to be taken taken from them, calipers or spring pinion gauges are used. If, for example, it is required to select a pinion of 16 leaves, open the calipers or gauge so as to take in six teeth of the wheel taken from the outer flank of the tooth to the outer flank of the sixth tooth. This is what is called six full teeth. For fifteen teeth, the calipers must extend not quite to the flank of the sixth tooth. For 14 teeth, take six teeth on the points, or the middle of their top; 12 teeth, five full teeth, when it is for a large wheel of a clock, and when it is for a watch, take five teeth fully on the points. For ten teeth, four full teeth, and for nine teeth, a little less than four full teeth. For eight, for a clock, four teeth on the points, and for watches, take four teeth on the points less the fourth of a space of one tooth. For seven, in a clock, three full teeth and a fourth of a space of one tooth. For watches, take a little less than three teeth of the wheel when finished, by forcing the calipers over them. For six, for clocks, take three full teeth; for watches, a little more than three teeth on the points. For five, three teeth on the points. For four, take two square and full teeth. When the pinion leads, take two square teeth of the wheel and a half of a space of one of the teeth more. In general, all pinions which lead ought to be somewhat larger than those which are driven.

MA: I just started a small repair shop of my own and am quite new at the business. I have had some customers come in who wanted to trade in some old gold

INFORMATION PLEASE

Directed by
W. H. SAMELIUS

Chairman, Science of Horology and Technical Advisory Board

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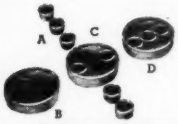

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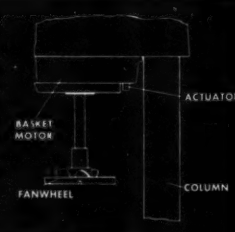
The reversing action of the MASTERMATIC is automatically controlled by the actuator externally projecting from the rear bottom of the motor. It automatically functions only when the basket is lowered into the solution jars. The machine is also engineered so that there is one direction rotation only in the spin-off and drying positions.



WATCHWORD OF THE WATCHMAKER
L & R

rings or old gold watches, and I am at a loss to know what to allow for the old gold and how it is weighed. Can you give me any information?

Answer: Old gold is worth 63/4c per karat per pennyweight. That is, an 18K gold ring weighing 10 pennyweight would be worth 18 times $ .063/4c times its weight, or a total of $12.15. Troy weight is used. Twenty-four grains equals 1 pennyweight, and 20 pennyweight equals one ounce; 12 ounces equal one pound.

NAT: I recently had the misfortune to lose an escape wheel and pinion in a small Swiss watch. I ordered a new wheel and pinion, and it seemed to fit perfectly, the balance taking good motion, but it gains a lot of time, far beyond regulation. I am puzzled to know what might be the trouble, as I know the watch kept time before I received it for cleaning, as I have been taking care of it for years. I have tested for magnetism and tried all the pinions to see if they were tight. The hairspring collet is tight, and I did not change the space of the regulator pins. Can you suggest what the trouble might be?

Answer: You say your watch gains a lot of time since you put in a new wheel and pinion. There are many small watches where models are similar, but gear calculations are different, especially in the escape wheel pinion. Some have a six-leaf pinion and others a seven-leaf pinion, and no doubt there is where your trouble lies. Count the number of teeth in the fourth wheel and divide by 10, and the answer will be the correct number of leaves for the escape wheel pinion. That is the conventional ratio between the fourth wheel and escape pinion for an 18,000-beat watch. As your watch gains considerable time, you probably have a six-leaf pinion instead of a seven-leaf pinion.

PS: I have considerable trouble in replacing suspension springs on a 400-day clock. What worries me is how to determine the proper strength or thickness to be used.

Answer: There is no given thickness for such a spring. These suspension springs are selected and tested the same as when you are fitting a hairspring to a balance. As a rule, the pendulum on 400-day clocks vibrates eight times per minute, and as the pendulum varies in weight and diameter, each pendulum consequently calls for a special spring of the proper strength to cause the pendulum to vibrate 8 per minute. These suspension springs vary in thickness from .003 to .005 inches. The average spring used for this work runs about .004 inches for thickness.

JHH: I recently took in a solid gold ring that was covered with mercury, and I had a lot of trouble removing the mercury. It took a lot of filing, brushing and buffing before I finished the job. Is there any easy way to remove the mercury?

Answer: To remove the mercury, heat the article to flat iron heat, then plunge the ring into sulphuric acid. The surfaces will then be free from the mercury and easily polished. However, this method should not be tried if the ring contains imitation or precious stones, as there may be a danger in overheating the stones or cracking them when plunging into the acid. It is best to play safe and remove the stones first before heating the ring.

TCS: I am about to take a position, having graduated from watchmaking school, and am curious to know, when hiring out as a watchmaker, what tools the store or employer supplies, and what tools I am expected to supply.

Answer: In a regularly equipped shop, the employer furnishes the bench, light and stool. There is also the cleaning machine, demagnetizer, friction jeweling tool, and all material necessary to carry on the work. You, as a watchmaker, are expected to have your own lathe, ample supply of chucks, small motor for driving the lathe, staking tool, poising tool and all small hand tools.

HET: I recently acquired what seems to be a very well made clock, and I want to convert the movement and fit it to a case, and I also want to use a seconds-beat pendulum. How may this be accomplished?

Answer: As you want to use a seconds-beat pendulum, it must be 39.14 inches long from the point of suspension to the center of the bob, allowing yourself anywhere from one-half inch to one inch for regulation. This is to take care for size or weight of the pendulum rod itself. Then multiply the number of teeth in the center wheel, third wheel, and divide by the number of leaves in the third pinion and escape pinion. This will give the number of revolutions the escape wheel makes per hour, divide number of revolutions per hour by

the number of vibrations the pendulum is to make, or 3,600. Then again, dividing the results by two will give the number of teeth required for the escape wheel. You will naturally have to make a new pallet to fit the new escape wheel.

RMS: We are having trouble with watches after cleaning that are brought in with the complaint that they run irregularly or stop entirely. Upon examination, we find that the oil has disappeared entirely. What may be the trouble? We are told that certain perfumes have an effect on watch oil.

Answer: Your question is quite often asked, and we cannot give any definite reason for finding the oil dried out. It may be caused by not thoroughly cleaning the watch. After the parts have been cleaned in the cleaning machine, the holes should be thoroughly pegged—the flat surface, the oil well and the hole from both sides, assuring yourself that there is no residue in the holes left by either the cleaning solution or the rinses. A watch taken care of in this manner, with the use of good oil, should run for many months without giving trouble. However, even if the watch is taken care of as suggested, it is still liable to be returned with complaint, and then, upon examination, we find the bearings dry or the oil thickened. This can be caused by the use of perfume. Perfume itself is mostly alcohol, and fumes from the alcohol, or perfume, is drawn into the watch. As the watch, we may say, breathes, when exposed to changes in temperature, if it is exposed to warm temperature, the air inside the watch becomes expanded and will find its way out through the seams or through the pendant. Then when the watch is exposed to cold, a vacuum is created and air is drawn in. This air, being saturated with perfume fumes, will in a short time contaminate the oil. No doubt you have noticed wrist watches that are covered over the tops of the plates or throughout the train with powder. This powder is drawn into the watch the same as perfume fumes, and naturally will affect the oil or stop the watch entirely.

WCR: Does the balance for alarm clocks or small clocks beat the same vibrations per hour as in a watch? Are alarm clock balances poised?

Answer: Balance vibrations per hour vary in different clocks. Some of our earliest alarm clocks beat 14,400 per hour, or 4 per second. Some beat 16,200 per hour, or 4½ per second, and then again, some of our smaller desk clocks having the alarm unit beat 18,000 per hour or 5 per second. All balance wheels are poised, and I am sure if the clock companies think it is important enough to poise the balance in order to give good service from the clock, many of our watchmakers should take the hint and test and poise every balance in every watch they work on.

To find the number of vibrations the balance makes per hour, multiply the number of teeth in the center wheel, third wheel, and fourth wheel, including the escape wheel, times two. Then divide by the number of leaves multiplied by themselves in the third pinion, fourth pinion and escape pinion. This will give the vibrations per hour.

At a recent symposium held by the Canadian Jewelers Institute, the following questions were brought up:
(1) Why do Elgin watches keep better time when they have a DuraPower mainspring?

Answer: All Elgin watches equipped with DuraPower mainsprings have proven themselves to be better timekeepers than watches equipped with carbon springs. The DuraPower mainspring does not set, consequently, there is constant power that will maintain constant arc to the balance, thus giving constant time.

(2) Some information on the new electronic watch will be appreciated.

Answer: So far, the Elgin National Watch Company has not issued instructions on the repair of the electronic watch. The electronic watch comes, as we may state, in three units. There is the cell, or battery, which takes the place of the mainspring and barrel. Then there is the regular train, the same as in our everyday watch. The third unit consists of a balance and hairspring and an escapement; however, instead of the cell driving the train, as in the case of the mainspring, the driving of the train is accomplished through the balance and escapement.

The balance makes 18,000 beats per hour, each beat picking up a tooth in the escape wheel, thus transmitting power back to the center wheel and the hands. It will require the same attention as any watch—

regular cleaning periods and replacement of the cell. Before putting the watch on the market, the Elgin National Watch Company will issue instruction pamphlets for the care of the watch. They will also have films and speakers to attend the various guild meetings and they will personally explain the handling of this watch.

(3) Should a certified watchmaker accept pin pallet watches or cylinder watches for repairs?

Answer: As a rule, it does not pay to repair these watches, as the price would not justify the time consumed. However, there are many of these watches still in existence as keepsakes, or having sentimental value, and the owner is anxious to have the watch put in running order, regardless of price. The certified watchmaker, or any watchmaker, should be in position to repair the watch, but before taking the job, he should make an estimate and have an understanding with the customer that the cost of repairs is far beyond the cash value of the watch.

(4) What is the best method of covering a worn stem hole in the plates?

Answer: This question or problem is often brought up and a good deal depends on the plates. One method would be to insert two half-bushings, using soft solder to hold them in place and then drilling a new bearing hole through the two halves. However, it is never recommended to use the soft solder for any watch work, as the fumes of the acid in the solder will in time create rust. The time compared for inserting bushings would take longer than to make up a special stem with extra large bearings to fit the worn hole.

(5) What is the future of the new electronic wrist watches as compared to the automatic watches?

Answer: Time will determine the future of the new electronic watch. Expectations are that the electronic watch will, in time, replace the automatic.

Here are several additional comments concerning recommendation by SAG, in the October issue of A. H. & J. that mainsprings and jewels should not be removed and that ten-cent store oil should be used in cleaning watches:

Mr. SAG: I see no reason why I should ask you, but what do you get for opening up the watch and pouring in some ten-cent store oil? You surely don't call yourself a watch repairman—or do you?—BDC.

* * *

Dear Sir: I am writing in reference to our friend, SAG, who gave a few tips to the trade in our column in the October issue. I'm wondering why I spent two years studying watch repair, when all it takes, according to our friend, is a case opener, a cleaning machine and a can of 3-in-1 oil. I can see why he's had no comebacks, for any customer who valued his watch would think twice before returning, even for a job without charge. My work with civil service, repairing watches, requires close adjustment, or the watches won't pass any of several inspections. None of SAG's tips would get a watch past the first inspection. If I ever have to return to repairing watches for the public, I'm afraid it's the work of guys like SAG that will cause me to quit the trade. And until watchmakers are organized, such parasites will continue to live off the reputation of watchmakers and will keep the wage of a skilled laborer to the level of the day laborer.—JLL.

* * *

Dear Mr. Samelius: In reference to our friend's tips to watchmakers in your October column, in this part of the country where we can't charge as much for a cleaning job as in some other parts of the country, we sure need to save some time. But I must take issue with our friend and ask him if he doesn't think it would be a lot better to completely disassemble the watch for an inspection of parts that would be impossible without a complete disassembly. Now I am sure you will agree with me. What about it? Let's ask our fellow watchmakers—what about it, fellows?—JTR.

* * *

Dear Mr. Samelius: In response to the helpful (?) tips by S.A.G. in the October issue, I am what I call a not-too-well-experienced watchmaker who has gone through the Western Pennsylvania Horological Institute and have been working on watches for some nine or ten years. S.A.G. reminds me of a recent trip to the barber shop when a heated argument arose about the watchmaking trade and the unfairness of a possible State Exam to license the watchmaker. I then asked his opinion about my opening a barber shop and trying to cut hair without going to a barber school or serving any apprenticeship. His howl was loud and long and indignant. When the barber finally finished expressing his objections to the watchmaker's hope for a reputable profession, I learned he had a curtained-off corner of his barber shop where he, too, repaired watches when he wasn't busy cutting hair.

The point I am trying to stress is that if S. A. G.'s knowledge of watch repairing is so minute, tell him not to poison the minds of the up and coming young watchmakers. As for the older and more seasoned followers of our trade, I'm sure they have done as I did, read it and laugh between temper outbursts.

I always read and enjoy "Information Please." Keep it up. My contributions are small to your column, as I don't consider myself much of a journalist, but I could not resist replying to such a challenge as that represented.—FAP.

* * *

And here is another interesting letter, concerning travel through space and its effect on watches.

Dear Sir: If we are to accept, as fact, statements made recently by the world's great scientists, mankind will, before long, be "cruising" through space.

An interesting question was recently brought up in class at the watchmakers' school which I attend. When man gets out in space, where there is no gravity, how will his watch be affected?

I believe that the rate would be considerably faster, due to practically no friction on the bearing surfaces which control endshake on the train wheels and the balance wheel. Side thrust friction would be still present in the train because of power from the mainspring.

I believe that a watch could be made, easily, to keep time in all positions in space by putting in a weak mainspring to compensate for the reduced friction.

Good poise of the balance wheel would still be necessary, but not as essential for positional timing as the "earthman's" watch. In space, the hairspring would have no gravitational error in the hanging positions.

In school there were many arguments, of course, as to just how a watch would "behave" in space. One student considered the matter settled by saying that by the time man heads for the moon, he will have Elgin's electronic watch to wear.

Perhaps he will have to set up a different system of time-keeping on the moon, as the days there are a couple weeks or so long.

Any and all comments from your department or from A. H. & J. readers on the subject of the "space-watch" will be gratefully accepted.—JC.

The Chronometer Escapement of A. F. Potter

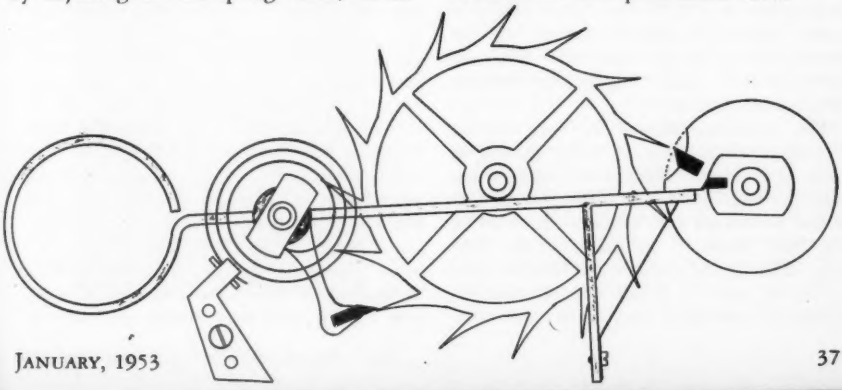
By W. H. SAMELIUS

A. F. Potter was established in Chicago and was known as one of our outstanding watchmakers. Besides carrying on a retail trade, he built pocket chronometers, his shop for building these chronometers being at the rear of his store.

He patented a chronometer escapement for which he claimed that the unlocking of the escapement offered considerable less resistance, and that the gold spring had better lifting qualities and decreased the friction or resistance of the spring as the unlocking jewel was on its return, tripping over the gold spring, ready to pick it up again in order to unlock the escapement and allowing the escape wheel to give its impulse.

It was of a pivoted detent type so the resistance to unlocking could be regulated by adjusting the hairspring collet, which was attached to the arbor carrying the detent and the long unlocking lever. The train for the watch was of gold wheels and jewels were in gold settings. Like all chronometers, it beat four-per-second, or 14,400 per hour, generally known as a slow train watch.

The plates were handsomely damaskeened and the balance wheel had a helical hairspring with meantime screws. The price range for these chronometers ran from $350 to $600, according to the grade of movement and style of case. He did not make a great number of these chronometers, so very few of them have found their way to the repair shop. What few of his time-pieces now in existence, are highly prized by watch collectors. These chronometers were 18-size. Mr. Potter carried on his enterprise about 1875.



Old Clocks Have Been Running Since French Revolution

By J. A. Jensen

TWO quaint old musical clocks of the bracket type have a history dating back to the days of the French Revolution. They were brought to the United States by a family by the name of Schmidt, who emigrated from the Black Forest of Germany in 1798. Custom duties on the two clocks amounted to $200.00, but since they were family heirlooms, the Schmidts were unwilling to part with them.

Thus it happened that years before Eli Terry had brought the clock industry to America by traveling the country roads of Connecticut on horseback with clocks for sale, the long pendulums of these two German-made timepieces were slowly tolling off the minutes in a pioneer home west of the Mississippi. One of the clocks is still running every day, keeping accurate time, while the other could be put into operating condition with but minor adjustments.

The clocks were doubtless made by Mathias Albert of St. Maergen, Germany, since his trademark appears inside of them, burned crudely into the wooden framework. St. Maergen is in the Black Forest, a mountainous district of southeast Germany which is still famous for its clocks and watches. No date appears on the clocks and there is no way of determining it exactly, but they were made sometime between the application of Galileo's law of the pendulum to clocks by Huyghens in 1657, and the time they were brought to America in 1798. They were probably made before the fourth quarter of the seventeenth century since the long or "grandfather" clocks superseded bracket clocks about that time.

The two instruments are very similar in make, being two feet wide, almost as deep, and about eight feet high when placed on the brackets to allow movements of the pendulum and weights. Each clock has three weights; one each for the running, striking and musical mechanism. The works are coarse, few and crudely made as compared to modern timepieces; but after two centuries of service, a surprisingly small amount of wear is to be noted.

Small barrel organs are built into the clocks, one playing organ music, the other band music. There are 24 keys and 48 pipes for each organ. The playing cylinders are eighteen inches long and six inches in diameter, each having a number of letters on it. These cylinders, which can be changed, were made by *B. Mukle and Sohne in Nawkirch bei, Fryberg, Groesherzog thus Badere.* There is one extra cylinder for each clock. The bellows of the organs are operated by cannonball weights.

Each clock has an oil painting on the front of the cabinet. One has a pastoral scene with the inscription, *Ezar Peter, Auf Den, Ladoga See,* referring to Lake Ladoga, the largest lake in Europe, situated in northwest Russia. The name probably refers to Peter the Great who caused the Ladoga canal to be constructed. It was in 1724 that a long and fatiguing tour of inspection of this latest of his great public works brought an attack of an old disease on him from which he expired a few months later. Two bust pictures of Asiatic men in turbans have places on either side of dial.

The original painting of the other was destroyed during the trip across the Atlantic in 1798. It has been replaced by a depiction of two slaves of pioneer America. A row of miniature soldiers across the top dressed in sixteenth century uniforms execute movements with different instruments as the organ plays band music. Just above the dial is the motto, "Memento Mori" (remember you must die), an effective inscription to go with the slow, rhythmic swing of the pendulum.

The Schmidts emigrated to America after being exiled from their home in the Black Forest during the French Revolution. In August, 1789, the French National Assembly proclaimed the freedom of the individual—*"The Rights of Man."* The French then moved into all countries

of Europe, planting liberty trees, and proclaiming their national device—"Liberty, Egalite, Fraternite." Especially was this true of the Grand Duchy of Baden, the home country of the Schmidts. Within a few years, however, the men who had come as neighbors became the oppressors. The French hordes moved through Kniebis pass into Black Forest in 1797 and the Germans had to flee for safety. Unlike many of their neighbors, who moved into the interior of Germany with hopes of returning to their native hills within a few years, the Schmidts moved to America.

About two generations ago, a descendant of the family moved from Missouri into the mountains near St. Paul, Arkansas, bringing the old clocks with him, a man of culture with the ability to speak several languages fluently. He built up a novel place in the hills which he called "Schmidts' Retreat." Although he lived a somewhat secluded life and had few intimate friends, his home was a fairy land of fruits and flowers. His location on White river in the Ozarks was somewhat similar to the home of his ancestors on the Rhine, in the land of the Felberg, Herzogerehorn, and Blauen peaks.

The old man prized his two musical clocks very highly and would not sell them at any price during his lifetime. After his death, some 25 years ago, they were sold with his other personal belongings.

The Circus Will Return This Year

BY STANLEY KIRK, SALES MANAGER, WESTERN DIVISION LONGINES-WITTNAUER WATCH CO.

What's the future in the jewelry business? Where are your new watch sales to come from? Well, Sir: *three million Americans Never Saw an Elephant.*

That's why the circus will come back this year. "Same old stuff," you say, same stunts, same clowns, same animals, same ballyhoo you saw when you were a kid.

STANLEY KIRK

Yes, largely true, of course, but since that same old elephant stalked through the streets a year ago, three million new Americans will have arrived in this country—three million more people who have never seen an elephant!

And in that same interval, more than a million boys will reach the girl-crazy stage and start shaving the fuzz off their chins for the benefit of another million or more young women who suddenly become acutely clothes, cosmetic, and jewelry conscious. Another three million folks will get married, start new homes, buy new rings, new dishes, new silverware. Yesterday, it seems they "weren't interested," today they are, and tomorrow other people will be.

That's why the same old elephant walks around serenely confident that among every bored group of people who say, "That's just an elephant," some eager voice will shout, "Oh, that's an elephant!"

These new faces looking at the parade will peer into your shop window and your place of business. All of them will be somebody's customers. The real operators and hard hitting merchandisers will reap a harvest, while the "good time Charlies" are bewildered and "crying the blues."

Business forecasts for the future are most encouraging and the jewelers will do a thriving and prosperous business if they know how to fight. So drive hard and fast—we are in an era of opportunity! The coming year will richly reward fighters!

—Courtesy of Pacific Goldsmith.

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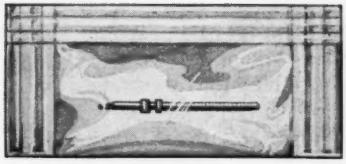

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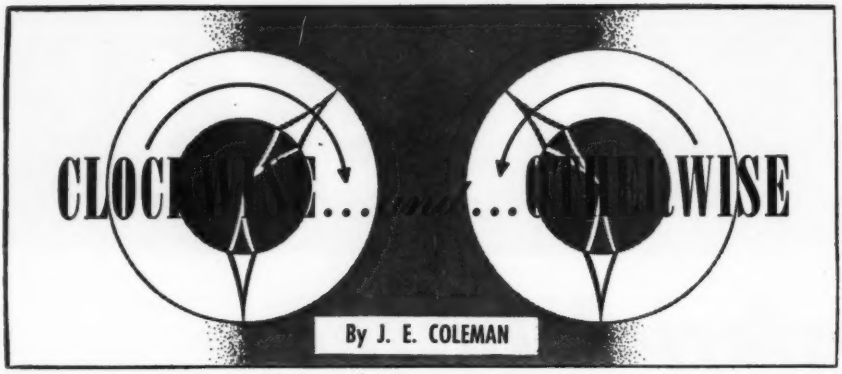

OTHERWISE

1953—a brand new year, and A. H. & J. starts Volume 20. Jan and I hope to bring you a bigger and better "C. & O." in '53.

Mail exceptionally good this month, but I regret to have to report that a large percentage of it fell into the "do not publish" file. One thing is a "lead pipe cinch" —I've learned that I'm not the only grandpap, and also that there are quite a few grandmothers around. Correctly cataloguing the "grandpap" mail shows that most letters are from those, like myself, with just one. However, it ranged all the way up to Friend Fred Ammann, of Akron, Ohio, who writes that he has sixteen grandchildren. Just sort of looking it over with the "cataloguing" thought in mind, we began to be impressed, by some of the grandmother mail, that we have more lady readers than we at first thought.

* * *

Only one new catalog this month: Burton M. Reid Sons, First, and Washington Street, Springfield, Illinois—their No. 10 —bench size—120 pages, well indexed. The back cover page is devoted to their special services, hairspring vibrating, special staff making, etc.

* * *

The month's L. D. call went to "Mr. Barny" (Bernard Goldstein, 218 East 59th Street, New York City), clockmaker, clock collector, clock tool maker and merchandiser par excellence of antique and unusual timepieces. Naturally we heard from Henry Freid, Wesley Hallett and Harry Birnbaum, et al. We were needling for "what's new in tools," etc., and learned that Barny has a few on the fire, among them a new movement holder, but nothing just ready to come out. Hope to have something next month.

Speaking of tools: Charles Terwilliger writes that the Horolovar Company (Box 299, Bronxville 8, New York), is ready with their new mainspring winder for 400-day clocks. These may be had through regular material dealers (via M. J. Lampert, distributor), price, $13.50. Mr. Terwilliger is also working upon a number of other 400-day tools and aids—they are ready to market a long taper, round brass pin for dial lugs, pillars and bottom chocks —these are 8/10 of an inch long, tapered from .03 to .061, packaged 50 to the envelope for one buck. Since these are so long, I'd think that the repairman might get from 70 to 80 usable pins from the 50-envelope when they are cut. They are also making up "jigs" for fitting suspension springs. The first one, ready about now, is for the Schatz model and will retail for $3.95. It is to be followed by the Kieniger model, and lastly, by a model for the Kern & Shone clock.

* * *

Dear Mr. Coleman:

You may not thank me for a correction of

Mr. Coleman invites your questions. If your question requires a direct answer, please enclose a self-addressed, stamped envelope. It is impossible through correspondence to give valuations of antique timepieces. questions of this nature cannot be answered.

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your answer to Robert McEntire of Columbia, South Carolina, in the November issue of A. H. & J.

What I am about to say is a technical correction, because I know what you mean. In the fifth line of your answer you say, "It alternates its polarity sixty times per second." As a matter of fact, the polarity is changed 120 times per second. Sixty-cycle current changes direction twice each cycle, as illustrated by the sine wave above and below the zero line.

Each point sets up an audio impression for the ear when the 60-cycle hum is heard, which makes the audio frequency 120 per second. I know you like to be accurate in the information you transmit.

Sincerely,
HOMER H. CRIDER

Box 515
Yosemite, California

Mr. Crider, we do thank you for your letter. Allow me to add that "in my book" this is just another form of co-operation. "C. & O." theme has been co-operation from the very beginning. Besides, if ever a time comes when yours truly can't take a correction or even some downright criticism, I'll throw in the sponge and take the count.

Now, how in the world could a fellow ever do that in the face of a good letter like this:

Dear Mr. Coleman:

I have been an ardent follower of your column for the last four years. While I do watch work as a main line, I do repair clocks on the side, at home. Many thanks for the help received through your column as you answer the problems of others.

I'm writing in regard to the answer you gave Mr. T. R. Odenath in the last issue. As previously stated, I am a watchmaker, not a hash repair man, but a good watchmaker.

I'll admit that there are a lot of quacks in the business—they should be boilermakers instead. But the point I wish to bring out is that there are a lot of watchmakers who will send a hairspring out rather than straighten it out. Some won't even set a roller jewel. If a watchmaker figures he can repair another watch in the time it takes to repair a hairspring, he sends the hairspring out to be done. The old saying, "Practice makes perfect," still holds true. If the watchmakers quit practicing their trade, they will soon lose their perfection.

Now if the watchmakers had a stabilized wage scale, I believe that some of the trouble would be overcome. I'm not exactly saying that we should form a union, but I wish something could be done.

I'm in charge of a repair department in one store of a fairly large chain, and my average earnings are from $80.00 to $85.00 per week. That is a 55-hour week. The average factory worker of comparable skill would net $135.00. A truck driver (takes six months' training) would take home $176.00. What is wrong with a skilled trade like watch or clock repairing, that takes four or five years to learn properly?

I would like to hear some comments on this situation, and especially your opinion.

For reasons that are perfectly plain, we omit the signature on this one; while we insist upon full name and address to all the "Clockwise" section letters and encourage direct communication from those addresses, and very often include full name and address of letters in this section, it is also quite clear from the sort of editorial angle we endeavor to give the "Otherwise", that a letter for the facts and thoughts it may contain is still in perfect keeping without the signature of its writer.

Conditions brought to our attention by this letter are not new, in fact, many if not most of us learned them "the hard way." His question, "What is wrong with a skilled trade . . ." is one that every bench mechanic should think upon long and hard.

I seriously doubt that my opinion (he asked for it) entirely covers the case. From time to time in this column I've mentioned various phases of it, and many times suggested that horologists look about them and compare their hours of work with other trades, their pay with other trades. From his letter, he has evidently been doing this.

It's going to remain this way just as long as the fellows insist upon being "rugged individualists." "United we stand, divided we fall" was never truer. The situation reminds me of a boyhood story, back on the farm. It is said a small bull calf jumped up on the railroad track to butt the locomotive and the farmer remarked, "I admire your courage, but it's d—— poor judgment."

One of the answers—and the question requires many—is a good strong association. The United Horological Association of America (1901 East Colfax Avenue, Denver, Colorado) has been representing the watchmaker and the clockmaker in every phase and angle of the whole industry for nearly 20 years. It maintains a well-equipped laboratory, staffed by competent technicians for the purpose of con-

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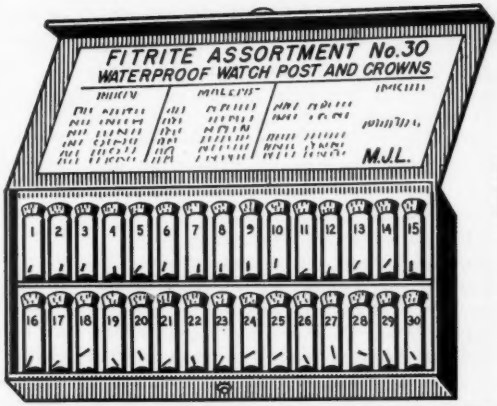

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ducting examinations and issuing proficiency certificates. This is but one phase of the work; it should be self-evident that no one phase or endeavor can or will bring about the desired results. The whole program, the over-all plan, will be required.

The situation as outlined in this letter may serve as an example. We may well take it that this writer's employer is paying him a salary in proportion to the shop's earnings—to say it another way, if the employer paid the $135.00 that the aircraft worker gets or the $176.00 the truck driver earns, the shop would have to place a price upon the individual job that would drive the customer to other shops. So, another phase of the over-all plan must include some public relations work.

It just doesn't make sense that John Q. Public has singled out the horologist and flatly says he (the watchmaker) is not entitled a wage commensurate with other skilled trades. I regret that a good portion of the blame for the condition falls directly on the trade itself.

I quote from another letter received in the same mail:

"Down here, we have it all beat, we have a fine watchmaker—35 years' experience—I know for a fact that he is good (no butcher) pegs all jewel holes and train wheel pivot holes when he cleans one. I've seen lots of his finished cleaning jobs—hairspring true and case polished. Price $1.00. No mistake *one dollar* and as small as a 210 Gruen. He will take no outside jobs, just citizens of this small town."

Think of the injury this joker is doing the industry—I wonder what he thinks when he requires the services of any skilled craft. He no more gets it for a dollar than he buys bread at 5 cents a loaf; a suit for $6.00 or gets his apartment for ten bucks per month.

I've seen this "cut price" racket in action—it's terrible. Back during the depression we had an influx of those 98-cent advertisers—customers would come in and object to a $3.50 price upon a job, saying that "so and so" does it for 98 cents. Our reply was: "If you want that sort of work, take it to him," to get this answer: "No, we don't want that, but if he can do it for 98 cents, you ought to be able to do it

for less than $3.50." The psychological angle is terrific and lasting; for years now the American horologist (benchman) plus all the chiselers that can creep into the trade seem to have exerted every possible effort toward pulling the "rug from under" the trade to which he looked for his livelihood.

It's going to require careful, planned, cooperative effort, day in and day out, 365 days per year on the part of every decent member of the craft to educate and enlighten John Q. Public and restore the trade to the high plane it once occupied.

* * *

I could fill the balance of this issue, and the other eleven issues that will follow to make up the year 1953, with stories like the following—an actual happening—less than ten days old:

We were shown a very nice eight-day, double-dial Waltham desk clock whose owner said it had refused to run more than five minutes at a time since he had last had it cleaned. As for the cleaning, it was an F.B.I. delight—fingerprints and smears all over it, and I doubt seriously that even the balance had been lifted out. The clock's owner was an "LLD" but his clockmaker was a "DLL" (darn liberal with lubricant).

In addition, he was one of those fine mechanics who can quickly discover the more obvious mistakes made by the manufacturer—as every reader will recall, the hands upon the back of these clocks run "free" upon a dead post; evidently this joker discovered that this back cannon pinion was a bit loose upon its post, and he did a good rough job closing it (brass) with pair of cutting pliers and forced it on plenty tight. Why a good, substantial citizen with better than average education, better than average money, and better than an average clock will leave that clock in the hands of a "dummox" with no more skill than this one displayed is anybody's guess. My guess is that that portion of his education had been sadly neglected, and we are partially to blame for it.

One outstanding example of "educating the public" has been done by the oil industry—today it is easier for the filling station operator to sell a motorist a quart of oil than it is for the grocer to sell the housewife a loaf of bread, simply because of "advertising."

Practically every motorist, including your dear reader, keeps an eye on the old speedometer and when another thousand or so miles roll off, has the oil changed. If I were to ask you why, you would probably answer, "Everybody knows you should change the oil every 1,000 miles—it wears out, gets full of sludge and wrecks your engine."

Well, our major air lines don't know it. Neither does the U. S. Air Force, the Greyhound bus lines and lots of taxis and truck operators. I am reliably informed that Greyhound has the oil in their busses drained every 10,000 miles. It is then re-refined and is used over again—some Greyhound oil has been lubricating engines for more than 200,000 miles. The Air Force has known this since World War I days, and the Bureau of Standards will tell you that "oils do not wear out mechanically—the viscosity of oil is, literally indestructible."

There you have it—"John Q." has his car oiled when it does not need it—his watch or clock goes until the bearings are worn egg-shaped and the pivots scored and finally it stops, then he wants to "complain" at service charges. Who is laying down on the education job? Certainly not the auto oil people.

By far, the greater burden of this task rests upon the shoulders of the individual bench mechanic; he needs, and should have the full help of, timepiece manufacturers and material jobbers. He needs to know and cooperate with his fellow mechanic; herein begins the cooperative effort and the basic reason for a live, active "Association." It is through such an association that help and cooperation from the manufacturer and jobber can be had. We verily believe that the Association" is *the* answer, having had some experience along that line.

Each time I advance this sort of reasoning some pessimist or Doubting Thomas tries to counter with, "Our state has an Association, etc.—we have the national (U. H. A. of A.) and just look, etc. . . ." Well, if you will permit an old, country slang expression, I'll readily admit we

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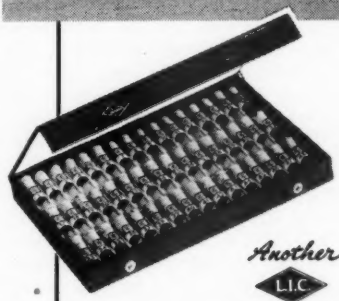

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haven't exactly "set-the-woods-on-fire" and just as readily say that we won't until such time as the bench mechanic, the individual member, is awakened to the fact that the responsibility is his—that he owes something to his craft. A double portion, if you please, what he owes and what the generation before him failed to pay (obligation met).

When this is accomplished, when he fully realizes that the responsibility is his very own and decides to meet it like a man, then and only then, will he, when approached upon the Association (cooperative effort) subject say: "What can I do to help my craft?" instead of: "What do I get out of it?"

Like the writers of these two letters, we too, would welcome some opinions and comments.

J. and J.

CLOCKWISE

Dear Mr. Coleman:

I am having clock trouble, and after reading your Clockwise and Otherwise for quite a while and enjoying it very much, I thought maybe you could assist me.

I am sending you photos of a clock that I have in my shop for repairs. It has no markings of any kind, either on the dial or movement, and my customer would like a short history on this movement if you are able to recognize it. I am also sending you a sketch, giving the dimensions of the movement and dial.

Now here is my problem—the dial, as you will note, has calendar markings on it. The date hand is mising, and also, I think, some sort of wheel which might be located on a post above the right (striking) winding wheel. Also on the left side of the movement is a shaft with two vanes near the bottom which work in conjunction with some sort of ratchet wheel which in turn works with a pivoted arm with a V-notch that extends to a wheel on the center shaft, which is behind the hour wheel.

The clock strikes the half-hours and hours through a rack mechanism, and it also repeats the hour strike at one minute

past the hour.

The small ratchet wheel near the bottom of the movement (above noted) has two small holes, so I assume some sort of cord drive is used to actuate the calendar mechanism.

I would appreciate any help you could give me as to missing parts and hook-up of date works so that I could put this clock in good shape. A number of the parts, especially the plates of this movement, seem to be handmade, and of excellent workmanship.

NORRIS WATMUFF
2612 Sharpless Avenue
Boothwyn, Pennsylvania

Dear Mr. Watmuff:

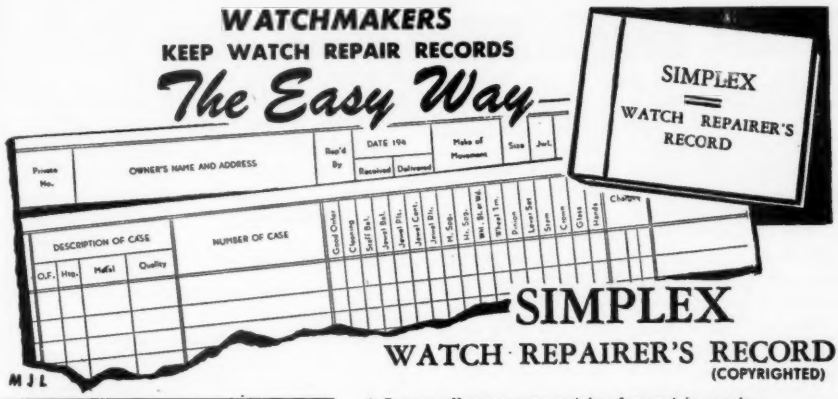
My compliments on some very excellent photography. You have a French provincial clock, apparently in pretty fair condition—possibly there's not so much missing as you think. We believe that you may be confused by thinking of only one mechanism, when in fact, your question relates to two, i. e., calendar and alarm. The calendar works once in 24 hours and the alarm once in 12 hours.

Let's consider the alarm first: The little ratchet wheel you refer to is the alarm driver, and operated the alarm by a weight and cord. The alarm hammer, definitely missing, works from the top of the arbor, vibrated by this driver. Make a hub exactly like that on the striking hammer and fit it on the square at the top of this arbor; the alarm hammer arm or handle is a wire exactly like that of the strike hammer; it works horizontally and in length almost reaches the bell support post. The head or hammer proper can be made of a much larger piece of round (wire) iron and in length is but slightly less than the diameter of the bell. It works inside the bell and when vibrated, strikes first one side, then the other. The disc riding friction-tight astride the hour pipe with one notch in it is the alarm release. It has its own pipe friction-tight on the hour pipe. So long as the tip of the pivoted arm rides the rim of this disc, the pin in the alarm arbor rests in the "V", and the alarm is held fast. When it falls into the notch, the alarm arbor is released and the alarm goes off. When the clock dial is in place, there fits upon the front end of the notched disc pipe a small dial, roughly the size of a half-dollar coin upon which the hours, I to XII are marked in reverse order. This arrangement is exactly like what you are accustomed to in the early 1900s' kitchen clock. To set the alarm, you simply turn this dial until the desired hour for the alarm's going-off is right under the hour hand.

The calendar is entirely a different and separate mechanism—quite simple. I am sure that you have already observed the 31-tooth wheel and the spring tension roller to hold it in place until kicked over by one tooth. Slightly above the second arbor pivot of the strike train, you have the post for the "kick-over" wheel. This wheel must revolve one time in 24 hours, and while they are generally driven from the hour wheel at a 2-to-1 ratio, it would seem from the nearness of the post to the hour wheel that it might be driven by the minute pinion with a 24-to-1 ratio. Such an arrangement would have to reach over and around the hour wheel; therefore, it must have had an arm extending from the top of the kick-over wheel hub that would engage the calendar wheel once each 24 hours (about midnight) and advance the calendar hand by one tooth.

This thing gets rather involved. First, we have the center or minute post, the longest of all members. Then the hour pipe is next in length. Over it rides the alarm wheel pipe a bit shorter, and last, over the whole, is the calendar pipe, still shorter. When the dial is in place, the calendar hand goes on first, then the alarm dial, which has an indentation in the hole fitting the alarm pipe, insuring the relation of the notch and hour marks of the alarm dial being locked. Then comes the hour hand, placed to coincide with the alarm release, and last, the minute hand.

This isn't as much of a job as this lengthy description might indicate. The cord and weight for the alarm is quite easy, so is the alarm hammer. All that remains is the alarm dial and one kick-over wheel. And, while your completed view does not show it, you may already have the alarm dial, as there seems to be something resembling it near the hands in the photo.



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If we can be of further help, do not hesitate to write.

J. E. C.

Dear Mr. Coleman:

A customer of mine is interested in a clock which he has seen. He claims the clock does not require any winding and that it is called the Atmos—perhaps after "atmosphere." Any information you can give me on this clock will be greatly appreciated.

JOSEPH T. BANKOWSKI
144 Jefferson Street
Stamford, Connecticut

Dear Mr. Bankowski:

The Atmos clock is manufactured by LeCoultre at Geneva, Switzerland. It is sold in the U.S.A. through the Longines-Wittnauer Watch Company, Inc., 580 Fifth Avenue, New York 19, New York.

The Atmos is a torsion pendulum clock, similar in principle to the German 400-day clock. It is driven by a mainspring in a going barrel, making about two revolutions per month. The spring is wound by variations of the temperature changes—the manufacturer says one degree C. change is sufficient to wind the clock for a 120-hour run.

The balance makes but one stroke per minute, as compared to the 400-day's eight. The train is fully jeweled, also the escapement, and it is very light—so light, in fact, that it is recommended that it be run dry, without oil.

We think you will find it currently advertised in most magazines, along with Longines watches, etc., and I know that the Longines-Wittnauer Company will be pleased to send you a folder describing it. The *American Horologist & Jeweler* in the lead article for June, 1952, covered the repair to this clock.

J. E. C.

Dear Mr. Coleman:

I am writing to you for help with two problems. I have a mantel clock case in good condition for which I would like to obtain a fit-up unit to convert it to an electric clock. The opening in the case is 4½ inches. I have tried Swigart's, Swartchild and Paulson, and they can supply me with these units for diameters 3½ inches, 4 and 5 inches, but no 4½ inches.

I would also like information on where an electric movement might be obtained to convert a large street clock to electric. Also, I would like to take this opportunity to tell you that I enjoy your department

very much. I especially like the points brought out in your reply to Mr. Odenath in the November issue of A. H. & J.

JOSEPH W. BEGLEY
1212 Summit Street
Portsmouth, Ohio

Dear Mr. Begley:

Thank you for your remarks on C. & O. The only "fit-up" units we have in our files are those by Sessions, coming in 3⅜ inches, 4 inches, and 5½ inches.

We do not have a table showing sizes used in popular electric clocks, thus one suggestion would be to go to your wholesaler. Take a ruler and check his stock—you might locate a clock that could be worked into your case. Buy it and discard the case. We've followed this method several times.

If your case is wood, is there a chance to enlarge the opening and use the 5½? If the clock has trim extending well above its general level, one can sometimes make a little wood rim to fit around the understep of the unit bezel; bevel or slant this rim, make it as narrow as possible and finish to match the case. The larger unit may be used, since the motor and clock are much smaller than the bezel diameter and always go into the smaller opening.

It would require more information than contained in your second paragraph to pinpoint an answer. You do not say how large, or how many dials. The usual way has been to place a separate motor unit and hands behind each dial. The Synchron motor, made by the Hansen Clock Company, Princeton, Indiana, is large enough to swing pretty good sized hands where you use an individual unit to each dial.

If you plan to drive the hands on two or more dials by one synchronous motor, possibly using an already existing "spider" and gears, a much larger motor would be required. Write to Mr. John S. Hartford, Supervisor, Special Clocks, Telechron Department, General Electric Company, Ashland, Massachusetts.

J. E. C.

Dear Mr. Coleman:

Weren't you just a little harsh with SAG? After all, if it weren't for watchmakers like him, watchmakers like me would never make a living. The reason he never gets a comeback is that his customers take their watches some place else when they stop, about a month after he repairs them.

May I please ask a favor of you? I have just finished cleaning a clock made by the Self Winding Clock Company of New York. It is very similar to a Western Union clock. I had to make a crude sketch of it in order to put it together again, and I'd like you to publish a good sketch for future reference. It has two large batteries connected in series, and then it goes parallel into the movement. It winds itself 15 minutes to every hour, and it has a light that goes on if the clock is connected for setting from an outside source. This clock belongs to a radio station and was brought to me as a private job because my boss recommended me as a good repair man. I do clock work at home, since there is no one else in town who repairs them.

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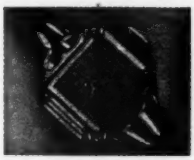

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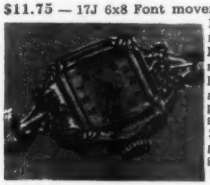

Rubin & Co.

93 Nassau St. New York 38, N. Y.

Dear Mr. Azous:

We like your letter because you state your views, but we hasten to, say that we are never intentionally hard on those who do not deserve it. Further, we can't hold with your thought that if it were not for the botchers the rest of us would be out of work, etc. It is my thought that without them we would have more work, better work and better prices for our work.

The "botcher" is a leach—a hitchhiker —upon the repair industry, and he is riding with us at our expense. He may make a few sales for the manufacturer by putting timepieces out of service for keeps, but he costs the bench mechanic much more than he ever makes business for him.

Other professions don't put up with him—you had just as well reason that the legal fraternity permits all kinds of "alley lawyers" to operate, saying that they would get their clients into more trouble, thereby requiring more legal service—or that the M.D. should not eliminate the quack because he would make people so sick they would require more medical attention.

First, if not foremost, our repair industry owes it to the public to protect them from botchery and all its attending evils. There is just time and space for one angle (I could give you hundreds). Your best customer is your steady customer. Today I did a 124 Seth Thomas Westminster chime which I'd overhauled 30 months ago. The job was easy and relatively quick. The price pleased the owner. Had this clock been in the hands of a botcher, overhauling it would have required twice the time, if not more, and it would not have brought twice the price.

Write the Self Winding Clock Company, 205-211 Willoughby Avenue, Brooklyn, New York, regarding the clock in question. This is the first query we've had on it. Perhaps the sketch you suggest and other data can be provided later if others are interested.

J. E. C.

Dear Mr. Coleman:

Would you please tell me where I can buy material for a Thomas Mercer naval chronometer? I need two jewels and a spring barrel. The dial measures 4 1/8 inches.

JOHN J. CREEDON
29 Lewis Avenue
Arlington 74, Massachusetts

Dear Mr. Creedon:

Write to Thomas Mercer, Ltd., Eywood Road, St. Albans, England. We think you should have more identification than the dial measurement.

There should be a serial number and possibly a grade number or identification

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on the plate. This is one of the old firms, being established about 1858, and is still very active. You will find them nice to deal with.

While on the subject of chronometers, have you a copy of the Hamilton chronometer repair manual? This 95-page booklet, well illustrated with drawings, may be had from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., for fifty cents. Order "Navships, No. 250-264."

J. E. C.

Dear Mr. Coleman:

Would you be so kind as to settle a dispute? My employer and I have argued the matter of regulating a 400-day clock. I maintain that the 400-day clock is not a good timekeeper to begin with. We had one placed in our front window during the summer months, and I made the statement that this type of clock would not take a rate when exposed to the hot summer sun during the day and then allowed to cool during the night.

Placed inside on the counter or any other place where the temperature variation is not so great, the clock will keep much better time, but still is not an accurate clock.

Your opinion in this matter will be greatly appreciated.

T. F. BASSETT

Gilroy, California

Dear Mr. Bassett:

It is said, "Fools rush in where angels fear to tread," and here is old C. & O. to settle a dispute.

Honestly now, you do not need assistance—just let the 400-day speak for itself. There are a number of factors that contribute to make it a notoriously poor timekeeper, the temperature error you mention being one of the principal ones. In tests made by the Horolovar laboratory, it was shown that a mere change of five degrees F. would alter the timekeeping on a 400-day clock equipped with the usual bronze suspension spring as much as 60 seconds in 24 hours.

Another factor is the variable escapement error. When the spring is wound up tight, the impulse is completed quicker than when the spring is partially run down; thus more of the impulse is delivered before the zero point of the oscillation, etc.

It would seem that the makers of the present clock deliberately construct the pendulum with its projecting balls, etc., in such a way that in its turn it must be interfered with by the air it has to move. We always have the barometer factor in all timepieces. No doubt you have noted that the hands operate from the arbor next to the escape wheel. Have you thought that all escapement errors are thereby more prominent than if the time indicators (hands) were located farther back in the train, as in the orthodox clocks?

Actually, the torsion action is rather complicated because when the pendulum twists the suspension spring it becomes shorter and therefore lifts or raises the pendulum a bit, and here a gravity factor enters in.

Possibly the fundamental principles of the 400-day clock are not as much to blame for the poor timekeeping we see today as is its construction. Just now there is coming upon the market a model that has been jeweled and is equipped with a suspension ribbon of alloy to compensate for the

temperature error. The Atmos clock follows virtually the same principles and is capable of a very steady rate. It has a full jeweled train and escapement. The balance reverses its rotation each 30 seconds instead of each 7½ seconds, is practically smooth, catching less air.

In "The Science of Clocks and Watches" by Dr. A. L. Rawlings (available from the A. H. & J. book department for $5.00) he has this to say about the 400-day clock:

"The best approach to a precision clock of this type (400-day) would therefore appear to be the use of a suspension made of elinvar or similar metallic alloy, with a brass disc to which would be added an auxiliary bi-metallic compensator enclosed in a spun brass cover (like the original 400-day clock) so as to present a smooth surface and catch as little air as possible. The escapement could be arranged to give its impulse near the middle of the spring and extend over a small portion of the total arc. The decrement being very small, the impulse error would also be very small, and its variations with the arc smaller still.

"There should be no circular error, and no substantial barometric error, though there might be some pseudo-barometric error due to variation of the arc affecting the impulse error. On account of its small size, it would be easy to put the whole mechanism in a constant pressure enclosure and if necessary to keep it at a constant temperature. In this way, nearly all the obstacles to uniform timekeeping which beset the pendulum clock might be avoided. The idea seems worth a trial."

J. E. C.

Dear Mr. Coleman:

I have been reading your column in the American Horologist & Jeweler and I have never noticed any information about where I may obtain an engineering or technical book on pin lever escapements.

We are manufacturing a recording clock for our bottom hole pressure equipment (used in testing oil wells) and I am fully convinced we need some engineering information on the design of a pin lever escapement. I noted the list of books mentioned in your November column, but these seemed to be more about the repair of clocks.

The information I want is the proper caeter distances of the pin location in relation to the arbor of the pin fork, also the

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spacing of the pins in width in relation to a given escape wheel, and the design of an escape wheel as to drop angle, slide angle, etc.

We make most of our parts, therefore we need all the technical knowledge we can obtain about these escapments.

D. C. DIXON

Dixon Instrument Repair
1242 South Braden Street
Tulsa 12, Oklahoma

Dear Mr. Dixon:

Frankly, we thought we might be able to lay hold of much data on the pin lever escapement until we started to answer your question. I'm asking you to take a rain check now, and I'll come up with something later. All the books you refer to are not concerned with repairs, for you will find much of the fundamentals in such volumes as "Precision Time Measures" by Charles Higgenbotham. I seriously doubt that there exists a combination of the items you require all in one volume, Besides, one might say that the basic escapement principles for all lever escapements are closely related, and so apply to the pin pallet lever escapement.

I suspect that what you might have run into is this: Since all the lift or impulse is upon the tooth face, the draw is necessarily unequal. Most writers devote a brief chapter or paragraph to the subject. ("Pin Pallet Escapement," Britten; "Pin Pallet Lever Escapement, Haswell; "Pin Pallet Lever," Chamberlain.) Britten deals almost entirely with the Brocot form, and in this escape wheel, teeth are pointed, the impulse coming from the point travelling across the circular pallet—the very reverse of what I think you have in mind.

Major Chamberlain deals with the Roskopf form, nearer what you wish, but does not give the answers to your questions. "Horology" by Eric Haswell, page 187, says: "Pin Lever Pallet Escapement—this is a form of lever escapement met with in only very common watches and alarm clocks. Impulse amounting to about two or three degrees is provided by the inclination of the wheel teeth acting upon the pallets, which are ordinary steel pins. A lever arc of 11 degrees is usual, and this is distributed between the pin pallet and the wheel to the extent of 2½ and 8½ degrees, respectively. Although many clocks and watches that are constructed with this escapement are capable of limited accuracy, the fact that the draw has to be provided on both pallets by undercutting the wheel teeth to an angle of 18 degrees causes a bad tendency to set on the exit locking where the draw becomes excessive."

J. E. C.

Dear Mr. Coleman:

One of my customers is building a home and would like to set an electric clock in his kitchen wall. He tells me there is a kit available whereby we can assemble the clock ourselves, and also that there is a dial permitting us to nail the numbers flush to the wall. Please advise where we can procure same.

E. A. PELLETIER

56 Broad Street
Auburn, Maine

Dear Mr. Pelletier:

We know of no kit, in the general sense that the term "kit" is used, for assembling an electric clock.

We have made up a number of these clocks—in fact, have two of our own. You can obtain from your regular dealer the Sessions W-3-X unit with long center post, or from the Hansen Clock Company, Princeton, Indiana, their series "C 600" units. These latter come in five center post lengths, ranging from ⅜ inches long to 1¼ inches long. In both instances these are the bare units—no hands, no glass or other fixtures.

You select the unit with the center post length proper for the thickness of the wall. Generally, these are installed by going to the other side of the wall and cutting a hole sufficient to securely fasten the clock unit, merely drilling a hole from the dial side to take the center post. A small trap-door is made and fitted as inconspicuously as possible for the back side and still permitting access to the movement (this is only necessary for servicing, as the clock is set by the hands).

Of course, hands are optional, and you can make them in design and size to please the customer.

Aside from the usual gummed paper

dial available at your regular material dealers, we know of no special dial for nailing flush to the wall. Mr. W. E. Burns, Jr., 5837 North Hope Street, Philadelphia 20, Pennsylvania, will make any type of paper dial you desire upon a special washable paper. You will have a wide latitude in making a dial. Your local hardware and five-and-ten store offers a variety of numerals generally intended for house numbers, mail boxes, etc. We've seen some very good looking dials made up by using them tacked direct to the wall.

A minute track can be painted, or use 12 upholstery tacks for the five minute marks and have no single minute marks or tracks at all.

We have one 18-inch clock so mounted (the Hansen unit) on which a dial was painted on pure white parchment paper. The paper was glued to a white plastered surface, masked off at its edge and sprayed with clear Krylon. We've seen one kitchen clock so made up (Sessions unit) with an 11-inch dial, applied metal numerals that were first coated with red enamel, and the hands rather fancily handmade from sheet aluminum and coated with the same red enamel. Red thumb tacks were used for the five-minute spots. Other kitchen appointments—canister set, curtains, etc., were of the same shade of red.

J. E. C.

Dear Mr. Coleman:

I have a very old wagon-spring clock made by Birge & Fuller. I would like to know where I can buy the chain that pulls the spring up. The chain has been repaired, but I would like to buy a new one if it is possible.

I also have two very old German clocks; both are musical and play like the player piano. I would also like to know where I can buy a chain which I think is called "ladder."

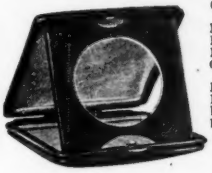
ROBERT MCG. PALMER
13 Esther Street
Brantford, Ontario
Canada

Dear Mr. Palmer:

Chains for the Birge & Fuller wagon-spring clocks have not been available for many years. We've seen replacements done in three ways:

(1) Where the customer especially

ARISTO LEATHER TRAVELING CLOCK CASES



No. 11A—Sheepskin case—Black, Brown, Blue, Red, Green, Tan, Keystone $7.00

No. 22A—Genuine Morocco Leather case—Wine, Red, Black, Blue, Brown and Green.....Keytone $11.00

No. 35A — Genuine Ecrase Leather with gold tooled border, Brown, Tan, Rose, Blue, Green, Keystone $13.00

2⅜" and 2⅝" for Swiss and Waltham
Immediate Delivery

ARISTO IMPORT CO., Inc.
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There's no substitute for
QUALITY & SERVICE

For Fast, Accurate, Dependable, and Courteous Service, send us your next order and be convinced. Thousands of satisfied customers can't be wrong.

A COMPLETE WATCH REPAIR SERVICE TO THE TRADE AT LOWEST PRICES.

MORIVA SPECIALS

No. 810
8¾L RGP top, steel back, domed crystal, 17 jewels. $10.75

No. WJ
17 jewel Service Watch—sweep second incabloc. Screw backs
Chrome top, $10.75
All Steel, $12.75
With all steel expansion bracelet $1 extra

Rhinestone D'als Optional at $1.00
Plastic Watch Boxes, 65c Each

IVAN P. MOREN
Watchmakers and Jewelers Supplies
20 West 47 Street • New York 36, N.Y.

wished to keep the clock as near the original as possible, the clockmaker made and riveted duplicate links, resulting in a handmade chain which was an exact duplicate of the original.

(2) The clockmaker can sometimes purchase a block chain, take it apart, discarding the blocks and substituting in its stead one of the connecting links. This of course, requires making rivets, etc., and the results, though "factory looking" closely resemble the original.

(3) Sometimes you can secure a block chain whose blocks are narrow (thin) enough to use as it comes.

As we in the clock trade know the ladder link chain, it is made from wire, usually brass. There is a high tensile iron ladder link that comes coppered. Most material houses used to carry it; however, it is difficult to get here, and I imagine the same is true in Canada.

Wire ladder link or sprocket chain is manufactured by the Bridgeport Chain & Manufacturing Company. However, their sales are confined to the wholesale, hardware and mill supply trade, and you cannot obtain it direct. We believe that the Boston Gear Works, Hancock and Hayward Streets, Quincy 71, Massachusetts, will be in a position to supply you with both block and ladder link chains. Write to them, and it is almost necessary that you send a sample.

J. E. C.

Dear Mr. Coleman:

Some time ago I asked you if you could help me locate some 1/8-inch bell metal chime rod. I wrote to several places, without success, but an ad in good old A. H. & J. did the trick, and I am passing on the information for your files.

Maas Organ Company, 3013 Casitas Avenue, Los Angeles 39, California, has steel chime rod in stock in any length.

Van Acco Time Repairs, 2221 Fowler Street, Cincinnati 6, Ohio, stock bell metal chime rod, 1/8-inch in diameter and 12 inches long at 75 cents each.

L. W. GREATHEAD

200 Edmonds Road
Redwood City, California

Dear Mr. Greathead:

C. & O. is grateful for your letter. After all, it is those answers we do not have that are the most wanted. This is good cooperation.

The information is herewith passed on to our readers, and four cards have already been made for the cross-index file.

We are also glad to have you say that the A. H. & J. ad paid off promptly. They tell me in the magazine world that it's the ads that "make the mare go." Again, thanks.

J. E. C.

Dear Mr. Coleman:

Could you tell me where I could buy an electric clock movement that would have feet on the dial side of the movement (so it could be fastened to a wall) and with hour wheel pipe, etc., at least 1/2-inch long and slightly longer if possible?

All I'm interested in would be the movement and hands—no dial, no case.

I'm using a movement that came out of a commercial clock that is labeled "Synchron, Princeton, Indiana," but I cannot find their address in the Jewelers Buyers' Guide.

G. H. COOPER

Aledo, Illinois

Dear Mr. Cooper:

Address Mr. A. C. Rothert, treasurer, Hansen Manufacturing Company, Princeton, Indiana.

Synchron movements may be had in six center post lengths—3/8 inches, 5/8 inches, 3/4 inches, 7/8 inches, 1 1/4 inches, and 19/16 inches.

These movements come with mounting ears on the front plate, with either rear or bottom set. From what you say, I infer that you plan to mount the movement behind the wall or else you would want mounting ears on the back plate.

The new Jeweler's Buyers' Guide represents a tremendous amount of work; some errors and omissions have been noted. Your C. & O. has written them offering our cooperation.

J. E. C.

The worst thing a jeweler can do is to compliment a customer when he doesn't mean it.

Always remember, a clerk will work eight hours a day for a firm he likes and 10 hours a day for a boss he likes.

GUILD MEETING DATES

CALIFORNIA

Long Beach Guild:
Fourth Wednesday of each month

Los Angeles Guild:
Third Wednesday of each month, 8 p.m. No meetings in August or December.
Election in November

IOWA

Des Moines Capitol City Guild Auxiliary:
First Wednesday of each month.

Cedar Rapids Watchmakers Guild:
Third Thursday of each month. No meetings July, August and December.

Fort Dodge District Watchmakers Guild:
Second Tuesday of each month. No meetings June, July, August or December.

Northwest Iowa Watchmaker's Guild:
Second Tuesday of each month. Meeting place rotates Storm Lake to Cherokee to Spencer

Waterloo Watchmakers Guild:
Second Thursday of each month. No meetings, July, August or December.

LOUISIANA

Alexandria Watchmakers Guild:
First Wednesday of each month,

Baton Rouge Watchmakers Guild
Second Tuesday of each month.

New Orleans Watchmakers Guild:
First Monday of each month.

Shreveport-Bossier Watchmakers Association:
First Thursday of each month.

Southwest Watchmakers Guild: St. Charles
First Wednesday of each month.

MARYLAND

Horological Guild of Baltimore: Last Wednesday of each month.

MICHIGAN

Greater Detroit Horological Society: Second Monday of each month, 8 p. m.

MINNESOTA

Minneapolis Watchmakers Guild: Second Wednesday of each month. No meetings July, August and December.

NEW HAMPSHIRE-VERMONT

Twin States Watchmaker's Guild: Lebanon, N. H., second Monday of the months of April, June, September, November, 8 p. m.

NORTH CAROLINA

Winston-Salem Watchmakers Guild: Second Thursday each month, 7:30 p. m.

OKLAHOMA

Oklahoma City Watchmakers Guild: Third Friday each month, 6:30 p. m. No meeting July and August.

SOUTH CAROLINA

Columbia Watchmakers Guild: Second Tuesday of each month.

Frank C. Buchan, U. H. A. A., died Monday, Dec. 22, at Long Beach, Calif.

For Nearly Six Years the Choice of Many Discriminating Watchmakers—the

Fisher-Freeman All-Automatic

Saves Time—Gives BETTER Cleaning

Exclusive Features:

1) Sparkless induction motor permits use of flammable gas—better and less costly.
2) 100% mechanical—just cams and gears. Simple mechanism is giving years of trouble-free service.
3) Available with Stop-and-Go (variable speeds, time extension) or reverse action. Write for detailed description and attractive price.

Direct from Manufacturer to you.

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"It's like having another man working for you—has paid for itself many times."—James L. Wheeler, Fairfax, Calif.

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1. **ROYAL'S dial refinishing service is used by watchmakers from Maine to California.**
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3. **ROYAL maintains the highest standards of workmanship.**
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5. **ROYAL'S air mail service is prompt.**

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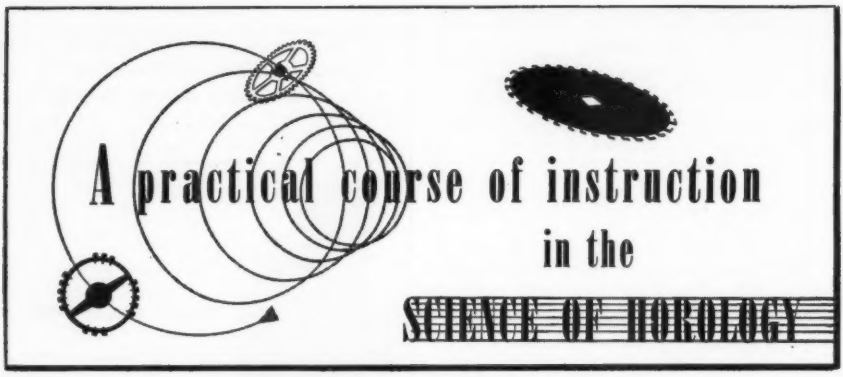
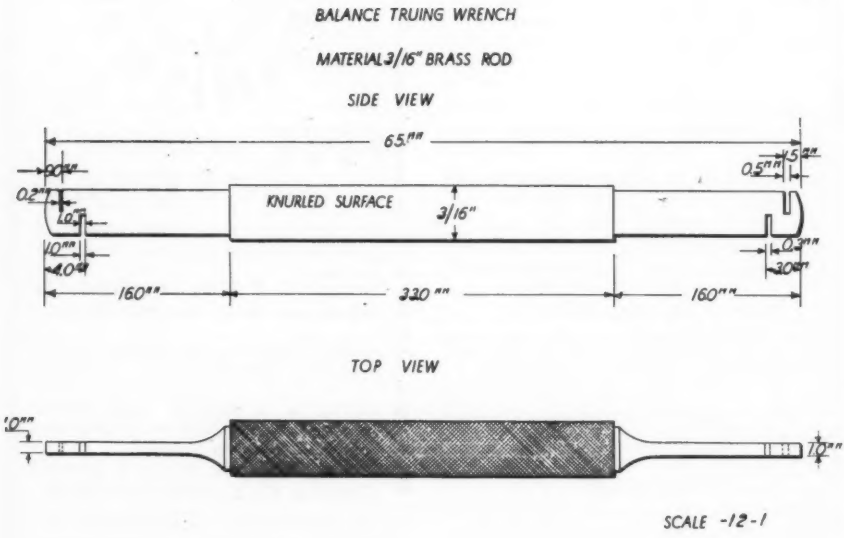


By Orville R. Hagans and D. L. Thompson

WATCH REPAIRING—LESSON 26



How to Enliven Dead Accounts

A Jeweler Chanced Upon an Idea that Unearthed Over $1,200 Extra from "Dead" Credit Accounts . . .

By RUEL McDANIEL

According to the recent experience of an Arkansas "cash" jeweler, a credit account is never "dead," regardless of how old it is, if the person owing it still lives. That, leastwise, is this merchant's conclusion, after unearthing more than $1,200 from accounts so old that all had been marked "dead" long ago and practically forgotten.

The happy experience occurred as a result of an old man's walking into the store and on back to the office, leaning on a walking stick with one hand and occasionally stroking his white beard with the other.

He sought out the owner and said, "Mr. Smith, eleven years ago I bought some stuff from you—ladies' wrist watch and some other things—and had it charged. I left town owing you that bill—$34.90. I didn't mean to beat you out of it. I just didn't have the money. Things were pretty tough then, if you recall. Well, I have some money now. So here's that $34.90. I want to clear my name on your books—and my conscience."

Naturally it was quite a pleasant shock to the jeweler, but he quickly recovered sufficiently to write out the old man a receipt. And as the man accepted it and fondled it momentarily as he folded it and methodically tucked it inside his old-fashioned "pocketbook," the jeweler saw the serene expression on the old fellow's face and it haunted him the rest of the day.

Being a practical business man, the merchant naturally began thinking of other very old accounts—those accumulated between 1932 and 1941 and long ago written off as dead. He wondered if possibly some other former customers might also be in much better financial condition now and would like to "clear their conscience."

He dug into musty files and unearthed his nearly-forgotten old accounts. He had

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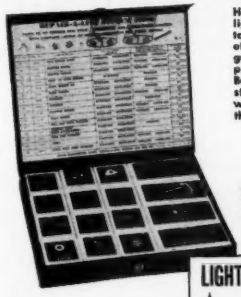

Here for the FIRST time is a lighter repair system that contains an intelligent assortment of 100 parts, unconditionally guaranteed to fit the most popular RONSON models. Build good-will . . . build store traffic . . . do over $50 worth of "cinch" repairs with the small investment of only

$10.75

Complete with chart showing interchangeability AND suggested resale prices.

Refills Always Available

FREE with each assortment, this traffic-producing 8" x 11" 2-color window sign.

☐ Payment enclosed ☐ Charge to our account

JOHN A. POLTOCK & CO.

15 MAIDEN LANE ● NEW YORK 38, N. Y.

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On the Watch

The enduring properties of Fulcrum oils assure lasting lubrication which guards fine timepiece mechanisms. For over forty years, jewelers have found Fulcrum the world's finest oils for all lubrication work. Time to order Fulcrum now—your jobber will supply you.

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FRANKLIN, PENNA.

not done a great deal of "borderline" credit business, but he knew he had accumulated quite a backlog of dead accounts during those depression years. He totalled the amount of these accounts and found that they amounted to $2,156.80. He was a little red-faced, for he had not thought the sum so much.

He wrote down the name of each debtor on a pad and opposite each name he listed the amount owed. As he listed the accounts thus, he also wrote down the last known address of the customer, as shown on the books.

Next, he had his office girl check each name and address against the latest telephone and city directories and change any addresses that did not conform.

These old accounts were owed by 319 persons. Of these, 177 still lived in the city, according to the directories. The rest were unlisted, but he did not throw away the records of the latter.

Now, he composed the following letter:

"Yesterday a gentleman who had owed us $34.90 for eleven years came in and paid up. He explained that conditions had been such that he had been unable to pay before. Now he was financially able and wanted to clear his record and his conscience.

"Your name, Mr. Nottingham, is among the old accounts we have dug out for one more reminder. I know you would have paid this account when it came due if you had been able. Now that your financial status has greatly improved, it may be that you, too, would like to 'clear your record and your conscience.'

"If so, here's a final statement. Legally, this account is uncollectable. It has been 'written off' our books. You naturally don't have to pay it. We simply thought, being the person you are, you would appreciate this one more opportunity. Here's a self-addressed envelope for your convenience."

The same letter, with the exception of the person's name and the amount owed, went to everyone of the 319 old delinquents, even though many of them apparently no longer lived in the city. The jeweler estimated that at least some of the letters to persons not listed would be forwarded by the postoffice.

Things started happening almost at once. The jeweler had been down less than an hour the next morning after mailing the bulk of the letters when he received a telephone call from a woman whom he had not seen or heard from since 1934. She apologized for failure to pay the account and said she was having her husband send a check at once. One man came in just before noon and paid off in cash.

Letters and checks arrived almost daily for nearly two weeks. Collections from those 319 "dead" accounts amounted to $1217.91. The money came from 159 individuals. Of the 142 names not listed in the city or telephone directory, 66 came back, marked "unknown." More than $400 of the collection, however, came from persons living in other cities whose letters had been forwarded to them.

Besides the money collection, the jeweler received apologies from 17 delinquent customers and promises to pay soon. He thinks he'll get more than $100 out of those promises eventually.

Not only did the idea, generated by an old man with a gray beard and a walking-stick, produce more than $1,200 in cash "from the blue," but it clarified relations with several former customers who are now coming back to the store and spending their money as in the old days.

"What was that awful squealing I heard when you went in the back room to get me a pigskin watch strap?"

My Favorite Jeweler

By IRENE CRAIG NEIL

He stocks a wide price range so that my budget has a chance to survive.

He refunds courteously any product discovered to be inferior and smoothes my ruffled feathers. He does not quiz me and make me feel as if it was my fault that the watch stopped as soon as I got it home. His name stands squarely behind everything he sells.

He shows his appreciation for my patronage by listing my name for a calendar or whenever he has helpful literature to distribute.

When I telephone my inquiries are answered as courteously as if I shopped in person. If he says my ring will be cleaned and ready on a certain date, I can depend on his word.

He is completely familiar with all his stock and can advise me in a choice of earrings or the care of my silver.

He does not say, "Will there be anything else?" in a listless tone but he makes some specific suggestion such as: "We have in some new charm bracelets, would you like to see them for your girls?"

He trains his clerks to say, "May I serve you?" not "can I help you?" He does not permit his staff to "dear" me or kiss my baby.

He addresses me by name and he knows where I live. He is not however an obviously high-pressure salesman.

The atmosphere of his store is gleaming and it is not necessary to blow the dust off the vases b e f o r e examining them.

He changes his displays frequently, especially in the gift department, to assist me with my shopping.

He does not burden me with his business worries but he has a cheerful, prosperous manner even if the jeweler on the next corner is giving away premiums.

I am convinced by his manner that nothing is too much trouble. He gives much thought to the human side of his business. I pass many stores en route and stop at his because he gives a personalized service.

Swiss Reverse
MAINSPRINGS
IN RUST-PROOF PACKING

No. 161—Contains one each of the best 144 springs for Swiss watches in 1-drawer Standard Steel Stack-Up Cabinet. **$34.25**

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The "Silent Teacher" enables you to see **your own errors . . . correct your own work . . . progress faster.**

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Write for full information

KANSAS CITY SCHOOL OF WATCHMAKING

1220 Admiral, Dept. HS, Kansas City 6, Mo.

Royal Gems for America's Queens

STAR sapphires—the engagement stone of royalty. Star rubies—the kingly stone of royal crowns. Fabulous gems that have been sought after and fought for throughout the ages.

Their desirability is, of course, based on many things—the most prominent being color. Perhaps you thought rubies and sapphires were different stones. Actually, they are the same. Only the coloring oxides distinguish the sapphire from the ruby. Red, however, is always reserved for the ruby; while sapphires may come in white, yellow, pink, and blue. The finest star rubies are a dark purplish red, known as pigeon-blood red; while the most valued star sapphires are a cornflower blue, often called Kashmir blue.

Our ancestors, however, were even more color conscious, for colors they believed had special significance. The red of the ruby implied to them— command, nobility, and valor, while the blue of the sapphire stood for great wisdom. The ancient Persians, in fact, believed that the earth was supported on a sapphire column and that it colored the sky blue by reflection.

You may not believe in superstitions, but your ancestors did. They endowed the gem stones themselves with magic properties. The ruby—the king of precious stones — served as protection against wounds. As late as the Fourteenth Century, the ruby owner was credited with "peace and concord with all men" and security that "neither his land nor his work will be taken from him and that he will be preserved from all perils—his house, his fruit trees and his vineyards from injury by tempests."

The sapphire meanwhile served as an antidote for poison. But for the star sapphire was reserved protection against the most evil of evils—the evil eye! According to legend, a person with this affliction causes evil to all—even to those who befriend him. A story was told, not so long ago, about one of these poor devils who lived in Italy. Naturally the poor man had no friends; for if some daring soul joined him for dinner, the

chair would slip and break his back, the waiter would spill the scalding soup over him, or he'd get run over by a taxi. Things went on in this vein for years; and the man with the evil eye grew more lonely, desolate, and desperate. Eventually he jumped out a window to end his life and the evils he brought. Unfortunately he fell on two passersby and killed *them*. Had he had a star sapphire to pass out to his friends—well, who knows?

Not only was the star sapphire supposed to be a prevention of such occurences, but the rays of the shining star were also endowed with special significance. The three lines which cross to form the star represent Faith, Hope, and Destiny. The star sapphire, in addition, was closely connected with love. Perhaps this is one reason why it has been used as an engagement stone of European royalty and why legend has it that Menelaus gave a star sapphire to Helen of Troy.

But there is more to a gem than superstition. One has only to go as far back in history as World War II, to realize the investment value of hardness. Throughout history, nomads and refugees, physically limited by the amount of material goods they could carry, found, in precious stones, a light weight and an imperishable source of money that did not suffer from the rate of exchange.

Of all materials on earth, the diamond is the hardest. Next in line come the

sapphire and ruby; and, in descending scale, come topaz, emerald, quartz, garnet, turquoise, opal, and pearl. Since there are quantities of quartz dust constantly in the air, gems softer than quartz tend to become roughened and lose their original beauty and luster.

The cut of the gem and its mounting is important, too. The oldest cut in the history of jewelry is the cabochon cut, or the high-polished dome. It is said that the ancients believed that this cut was especially beneficial to people suffering from nearsightedness. And they had a point; for transparent stones, if cut in the shape of a hollow cabochon, formed concave lenses. It has even been said that Nero, that playboy of the ancient world, used an emerald, cabochon cut, to get a better view of the gladiatorial combats. The cabochon cut remains as the proper cut for such stones as star sapphires and star rubies, fire opals, moonstones, and stones with a tiger's eye. For only with this cut, is the distinctive beauty of a silky surface, the twinkling star or unusual marking most vividly shown.

Perfection is, of course, one of the most desirable assets of any jewel, and perfection is nearly always thought of as a rarity. Few Americans have glimpsed, outside of museums or private collections, Nature's most perfect star sapphires and star rubies. Jealously guarded, few have ever left the Orient. They remain in the East as treasures of various and sundry Maharajas and mighty potentates. In addition, many of the world's best deposits have been exhausted and no comparable new ones found. Yet—it was this very rarity of perfection that helped industry create star sapphires and star rubies as perfect as Nature's finest.

The industrial use of gems, as you might guess, began late in the history of the world and early in the history of machinery. As the hardness and durability of precious stones became known, it became evident that perhaps it would be cheaper to use precious stones than to keep buying and replacing worn bits of softer metal. Thus diamonds were used to grind lenses, cut glass, grind threads, and were used in drills, and dies—ex-

EVERYBODY WANTS a TREASURE DOME
T. M. REG.

There's a sensational demand for these Treasure Domes. They've been market tested, proved, pre-sold, and nationally advertised in leading magazines. Makes old watches modern, useful timepieces . . . ideal for medals . . . 80% of your customers have heirloom watches. Get their repair jobs and gain goodwill. Du Pont Lucite Dome. Ebony, mahogany or blonde base. Impulse item. Display with watch. See them sell!
RETAIL AT $3.95 EACH. ½ dozen $14.22; 1 doz. up, $24.00 per doz. Shipped prepaid if check with order. No C.O.Ds. (6 doz. shipped open acct. to D & B rated stores). Carol Beatty Co., Dept. J-7, 635 S. Kenmore Ave., Los Angeles 5, Calif.

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No. 101

Dainty 17J 6x8L Font with good looking, simple, clear figured dial. YRGP Top—Steel Back-Dome Crystal. YOUR COST....$10.25 In 14K Gold case $12.50	**17J AS 1194 watertite, steel back SWISS CASE, incabloc, luminous dial and hands, sweep second .....$10.95 No. 102 in all steel.....$12.95 No. 103/ss: full swing pendulum automatic all steel .....$18.00 No. 801: lady's W. P.....$12.95**

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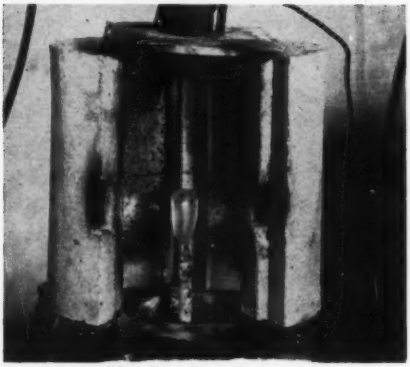
Send for complete price list and photographs

KERSWILL



The Sapphire Furnace

pensive, of course, but less so in the long run than cheaper metal.

Because the Swiss are famous for their watches, it is not surprising that they were among the first to invent synthetic stones to use in their watches. This, indeed, was a revolution. At once the limited quantity, the high cost, and the many imperfections in natural stones vanished as stumbling blocks for industry. Here were man-made stones that could be produced in unlimited quantity, of high quality, and of uniform size. Perfection was of paramount importance.

Principal among the synthetic stones were the sapphire, ruby and spinel—with Europe as the principal supplier. There, in one continent, were made the vital jeweled parts of compasses, recording instruments, electrical instruments, precision gauges, and many of the vital parts of the very machinery on which American industry depends.

Then—came the war and the closing of foreign trade. Suddenly, our whole supply of these vital man-made gems came to a halt. Yet a battleship, to function at top performance, requires some 4,000 of these jewel parts. Each bomber requires some hundred jewels.

It was at this point that Linde Air Products Company, a Division of Union Carbide and Carbon Corporation, entered the picture. The Government sent out an urgent top-priority request for man-made sapphires and rubies. The people of Linde rolled up their sleeves and went to work. Sixteen months later the first sapphire plant was opened. And soon after, American planes and ships began wearing American man-made sapphires and rubies.

At the end of the war, the people of Linde continued their production of synthetic sapphires and rubies for peacetime industrial use, and made an even more intensive study of the gems that they had made. In the midst of this study, something happened.

In one of the laboratories, after several months of infinite research, from the silken depths of the stone, a perfect six-pointed star shyly winked. A Linde star was born. Here was a stone identical—physically, optically, chemically—with the fabulous star sapphires and star rubies of the East.

Aside from price, the only difference between the two is that in Nature's jewels, formed over eons of time, the growth marks appear as fine straight lines. In the man-made gems, time, capsuled in the laboratory, has curved these fine lines.

These are not imitation stones—they are the real thing—made by man. Here, in America, in neat rows of tiny individual furnaces that are about a foot high—Linde star sapphires and star rubies are made. On a little pedestal in the furnace stands the sapphire seed, as it is called. Onto this seed is fed a very fine, very pure powder—aluminum oxide, which is exactly what you'd have if you took a natural sapphire and crushed it into a powder.

As the powder crystallizes on the seed in the intense heat, gradually hour by hour, the sapphire grows—in the shape of a carrot standing on its tip. The full grown sapphire may be from 1½ inches to 4 or more inches tall.

Thus—from a laboratory—come man-made Kashmir blue star sapphires to rival the finest of Nature's stones from Kashmir, Ceylon, China, and Siam. And from the same laboratory come man-made pigeon-blood red star rubies to rival the finest of Burma, Siam, and Ceylon. Each man-made gem as individual as Nature's own, but built to requirements far stricter that those used by Nature when her laboratory was a whirling mass of molten fire and matter.

Are You Putting Up a Good Front?

By DAN VALENTINE

There's an old saying in the selling game which says a successful salesman is fifty per cent "front" and fifty per cent enthusiasm. Well, the same thing goes in any retail field.

Just for the sake of curiosity I strolled through the downtown section of my home town one recent evening and checked on the "front" being put up by the retail jewelry stores in my community.

The results—while somewhat astounding—were not too satisfactory.

It seems that too many retailers—and this holds true for retailers other than jewelers—forget their shops at closing time.

Too many jewelers forget that their shop is a 24-hour advertisement for the firm even when the doors are locked.

And it was interesting to note that a casual stroller could almost judge the integrity and the success of a retail jewelry store by merely glancing at the shop's front.

For example, one retail jewelry shop in the downtown section of the community had two unsightly stickers, half-torn, attached to the front window which gave the establishment a slovenly appearance.

It was also interesting to note that one shop had two letters of the neon sign out, and another shop had a tattered old torn awning still hanging over the front although I'll wager the awning hadn't been used for several seasons.

In several of the other shops there was a conglomeration of some dust and papers in the front doorway of the establishment and it was amazing to find—inasmuch as this was a winter evening—that practically all of the retail establishments, and that goes for all other retailers in addition to jewelers, had failed to shovel the sidewalks after a recent snow.

So it seems that while many jewelers keep themselves intensely interested and alert to the new trends in merchandising and advertising a large majority of these are so near to their own establishments that they forget that it pays for a store—

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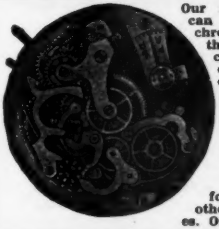

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as well as for a person—to put up a good front.

So in the interest of checking your own shop's "front" here is a checklist:

1. Are your front windows clean? I noticed one retail jewelry establishment in particular that had a very eye-appealing window display which showed initiative and originality but the entire effect was lost because the windows were dirty. Now it seems logical that when a jeweler takes the time, energy and money to create an eye-catching window display he could also take just a few more minutes and have the front windows washed.

2. Do you have any burned-out electric lights in your window? I noticed several of the establishments had one or two burned-out bulbs in the front window display and this created a bad impression and nullified much of the sales effectiveness of the good-will impact of the window displays.

3. By the way, do you turn your window lights on on dark afternoons? Too many jewelers turn their front window lights on by the clock and not the calendar. On dull winter days when dusk falls early it's just good business to turn your lights on and on foggy, rainy afternoons lights in the front window of your shop give a warm, cozy atmosphere and generate a feeling of good will within the store.

And it was amazing to discover that fully half of the jewelry retailers failed to leave their window lights on for evening shoppers. This is a poor way to save a few pennies. After all, the few cents it will cost to leave electric lights on say until eleven p.m. or even midnight are well spent because your windows and your window displays are your evening showcases for your merchandise and many a sale and good impression has been made by a warm, well-lighted window glanced at by strolling evening pedestrians.

4. And remember, it is also important for the overall effect of your front window displays to keep a careful check on your window backgrounds. Have they been painted or washed recently? After all, the background of your window is the part that ties in the entire window display and if this background is dull and dirty and ill-kempt it spoils the effectiveness of the entire window impact.

5. Now, you'd better check those signs. A neon sign in full bloom is wonderful but a neon sign only half blooming is a bad advertisement for your store. One single burned-out letter in a sign destroys the effectiveness of the entire sign so keep those neon signs working and, incidentally, it is also a good idea to check your gold-leaf lettering on the front door and your front windows to see that it is not scarred or scratched because gold lettering when it is perfect is wonderful but when it is scratched it doesn't look too good.

6. How is your awning? Here again a clean, bright well kept awning is a definite attribute to the appearance of your store front but a ragged illkempt old soggy awning certainly lends nothing to your establishment. And by the way, although this has nothing to do with actual store front appearance, it is always a public relations factor to lower your awning on rainy days to protect passersby.

7. Do you have any old stickers or decals on your store front? Here again an attractive perfect sticker or decal if it is placed in the right spot will lend prestige to your store front but a decal or sticker half-torn waving in the wind lends nothing to your store front appearance.

8. If you are in a two-story building remember the appearance of the second story is just as important to the overall

"This new clock not only turns on the coffee in the morning, it drinks a cup with you."

"Oh, don't bother reaching for your collateral—we'll extend our easy credit terms for this watch!"

appearance of your store as your front window. Check the windows on the second floor immediately over your front windows to see that they are clean and shiny at all times because they will help to create a more neat appearance for the entire unit.

9. And, to bunch a lot of little things together, how about the front door of your store: does it open easily and safely so customers can come in without pushing their way in, is the lock on your door stuck so the customers can't come in, does it need a paint job; how about the screen door in summer time, does it sag, could it use some bright new screen; and is your entrance kept clean and immaculate at all times without wadded up paper and debris in the corners?

All these little items add up to one big thing—the front of your store—and remember when you see a person for the first time you base quite a bit of your immediate opinion of this person on his actual appearance. It's the same way with your retail jewelry establishment. Passers-by—all potential customers—look at the appearance of your store, subconsciously study the front of your establishment and make up their minds whether to become customers.

So it always pays to keep up a good front!

A wise jeweler is not the fellow who knows everything—it's the fellow who knows everybody!

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Is Parking One of Your Problems?

Many modern jewelry store owners are in the curious position of the old lady in the shoe—they have so many cars they don't know what to do. We're talking, of course, about customers' cars!

As if jewelry store operators hadn't enough trouble these days, they now have to consider the parking problem headache. And it is a headache.

America's streets are becoming more and more congested. In the larger cities, parking has become the bogeyman of the retail businessman. And that includes retail jewelers.

Already, far-sighted jewelry store operators are eyeing prospective sites on the outskirts of town, and in suburban business areas.

The fact of the matter is that the American people own too many cars for the downtown businessman's own good.

Unless a jeweler can offer free and easy parking facilities these days, business will fall off. Customers will not cruise around and around the block looking for a non-existent parking stall. They'll drive to the jewelry store which offers parking instead.

There are five basic ways to solve your parking problem:

1. Arrange with a private parking lot operator near your establishment to provide parking facilities for your customers. Usually, these arrangements can be made on a per-car basis or for a flat monthly fee.

2. Cooperative parking lots where you and several nearby business establishments go in together and lease parking facilities on a cooperative basis. Usually, the cost is pro-rated by the number of cars for each establishment.

3. Large parking lots created by local organizations like the Chamber of Commerce or merchant groups.

4. Arrange with local officials and the police department for restricted parking near your store, in other words the installation of parking stalls with 10- or 15-minute time limits.

5. Operate your own lot at the side or rear of the store.

Of course, the best answer to the problem is the latter—the creation of your own parking lot. Many jewelery stores have cleaned out their rear yards or space at the side of the store for a small private parking lot. A jewelery store does not need a large lot like a super market or a department store. Even a small lot with five or six stalls is adequate.

If you have a private parking lot or are contemplating a parking lot of your own, here is a checklist to follow:

1. Experts agree that a parking lot should be at least twice the physical size of your store. Of course, this rule is flexible. But naturally, the larger the parking lot, the better.

2. Be sure and have a rear or side entrance—an attractive one—for your customers. They won't want to walk through an alley.

3. If possible, make sure that the parking lot is paved. There is nothing better than a muddy lot to destroy goodwill and business.

4. Use slanted parking stalls to enable customers to enter and leave the lot with ease.

5: Use white or yellow lines to indicate parking stalls to obtain maximum parking from the lot.

6. If possible, use a lighted lot—especially if you keep evening store hours. This will offer protection against prowlers and car thieves.

7. Use wide stalls. There is nothing so irritating to a customer than to be forced to squeeze in and out of a car door.

8. Keep lots clean. It is bad public relations—and it reflects on the store—to maintain the lot in a messy manner with papers and circulars scattered around.

9. There are bound to be accidents on any parking lot, no matter how small or how well laid out. Check with your insurance broker for coverage to protect you against petty claims.

10. Don't allow non-customers to abuse your parking lot. A time limit—a reasonable time limit—should be placed on parking in your lot, and a careful check should be made periodically. However, it is just good public relations to allow regular customers to use the lot to make small purchases at neighboring stores. But don't let them abuse the privilege. And don't

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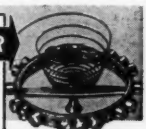
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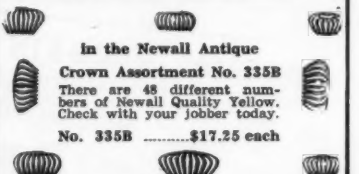

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let your employees take over the lot either. We can recall one jeweler who maintained his own small parking lot and it wasn't long before the stalls were all jammed with employees' cars. That's no good!

11. Erect signs disclaiming any responsibility for articles lost in parked cars.

Well, that's the parking lot checklist. If you don't have need for it now, clip this out and file it away for future reference.

The parking problem is here to stay!

How to Lose A Sale ... Perhaps A Customer

By CHARLES P. FITZ PATRICK

Catharine Customer had noticed the cord on her watch band was frayed so she decided to inquire about having it replaced at the shop of Robert Retailer. In the store she asked the proprietor, "What would it cost to have a new cord put on this watch?" She removed the timepiece from her wrist as she spoke.

It was a job Retailer did regularly, so he replied promptly. "That would be only seventy-five cents. If you have a few moments, I will do it while you wait." The girl smiled, "That would be fine. I'm lost without a watch." She started looking over the items in the cases as Retailer went to work at his bench in the small room back of the shop.

The saw tooth grips that held the cord ends to the expansion part of the watch band showed wear. Robert Retailer also noticed that the tension on these parts would have to be adjusted. Actually, the job called for replacement, but Retailer spent a few extra minutes tightening and fitting the pieces as he went about replacing the cord.

When Catherine Customer looked at the completed job she nodded approvingly. With the watch again on her wrist she beamed her pleasure, paid the seventy-five cents and walked from the shop.

But the following day the grip ends on which Robert Retailer had spent the extra time gave way and the watch fell from Catherine's wrist onto the hard floor of the office where the girl worked. Her surprise of the moment quickly gave way

to anger. "Why I only had this fixed yesterday," she explained to a coworker.

When she stormed into the shop of Robert Retailer, Catherine Customer insisted that it was the store owner's poor workmanship that had caused the accident and he should repair the watch without cost. Explanations did not impress her. The fact that the band was old and should have been replaced merely brought forth the question, "Then why didn't you tell me?" And, actually, she was right. The band should not have been repaired. But Retailer was attempting to save the girl some money when he devoted the additional time to tightening the grips on the band. In an attempt to hold the goodwill of the customer he repaired the watch at no cost to her.

Had Robert Retailer discussed the desirable attractiveness of a completely new band plus the increased safety, he would have enjoyed a higher initial profit and prevented conflict with a customer.

CORRECTION—

In the article, "Pennsylvania and New England Clockmakers," by Samuel Barrington, appearing in the November issue of 'A. H. & J., a paragraph concerning the cases of Jacob Custer should have read: "Custer's cases on his shelf clocks were of the pillar and scroll type, possibly copied from Terry, but more likely from Dan Rose of Reading, who made a tall shelf clock in 1771. Because of a typographical error, the word "shelf" was omitted from the article as first published.

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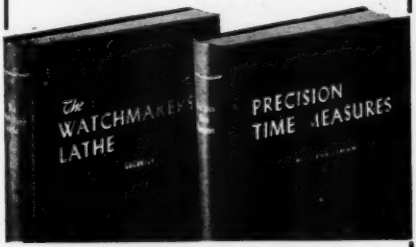

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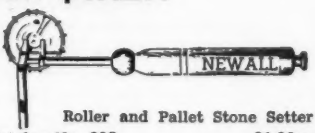

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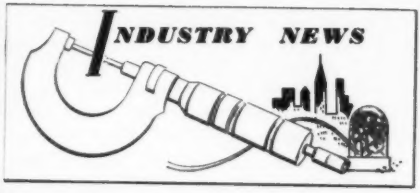
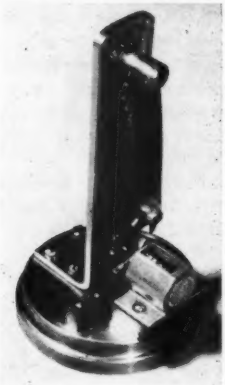


'CENTURY' CLOCK TO MARK PASSAGE OF NEXT CENTURY



This strange looking object now on display at the Museum of Science and Industry in Chicago is an exact duplicate of a hundred year clock recently placed in a cornerstone of the Museum. The "Century Clock" consists of a bi-metallic strip sensitive to temperature change, and an odometer. The device registers each time the temperature falls to 20 degrees after rising to 80. The clock, designed by George G. Ensign, research director at Elgin National Watch Company, was built by museum scientists. Its "twin" won't be seen again until 2052.

UNIVERSAL WATCH SUPPLY CO. TAKES NEW, LARGER QUARTERS

Since the first of January, the Universal Watch Supply Company, formerly at 9 Maiden Lane, has been occupying new offices at 93 Nassau Street, New York 38, New York.

According to the management, the move to larger quarters was made necessary by the ever-increasing volume of mail order business, and by the firm's desire to maintain the highest standards of mail service and efficiency.

SWISS WATCHMAKERS DEDICATE AD TO 'QUALITY JEWELER'

For the third consecutive year, The Watchmakers of Switzerland will dedicate one of its national consumer advertisements to the "quality jeweler" and his position in the local community.

A four-color, full-page ad, scheduled for March, will be headlined: "He's a specialist in pleasant surprises." Copy will emphasize that the quality jeweler is "unique among the friendly merchants in your town . . . with very special training, knowledge and ability."

The Swiss ad will also point out to the consumer that "only an expert jeweler is qualified to counsel you when you shop for your most cherished gifts."

In the U. S., the ad will run in Life, Look, Saturday Evening Post, and Farm Journal; in Canada, in Time Reader's Digest, Selection Du Reader's Digest, Le Samedi, and Country Guide.

The illustration appearing in the ad is reproduced in full color in a three-piece, three dimensional display which will be distributed to retailers. It can be used as an in-store or window display.

Foote, Cone & Belding International is the agency.

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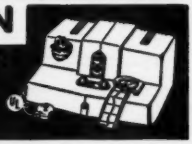
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